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THE
OPHTHALMIC REVIEW,
A
MONTHLY RECORD
OF
OPHTHALMIC SCIENCE.

EDITED BY

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NOTE ON AN INSTANCE OF MARKED HEREDITY IN A FORM OF CATARACT DEVELOPED IN EARLY LIFE.

BY G. A. BERRY, M.B., F.R.C.S.ED., OPHTHALMIC SURGEON
ROYAL INFIRMARY, EDINBURGH.

Last August I had occasion to needle for cataract in the case of a young girl of 14, Janet Maxwell, from Lochmaben, Dumfries. The vision was at the time of the operation reduced in both eyes to mere perception of light, corresponding to the existing condition, viz., dense complete cataract. She stated that her blindness had come on slowly after she was six years of age, and after she had begun to learn to read. Little more than a month afterwards a cousin of hers was admitted to the Royal Infirmary, under Dr. Argyll Robertson, and needled by him in October. In this patient, Jemima King, aged 16, cataract also began to develop at the age of six or seven years.

The similarity in the history and condition of, as well as the relationship existing between, these two patients, caused me to institute an inquiry, which led to the discovery of the very marked hereditary predisposition to this form of cataract, which is shown in the annexed table.

The facts were for the most part elicited at my request by my clinical assistant, Dr. George Mackay, whom I have to thank for the very thorough manner in which he collected them. Most of the informa-

tion: was obtained from Mrs. Easton,* who proved most obliging and intelligent. As the same questions were occasionally put to her in different ways, and always elicited the same answers, there is every reason to believe that the information supplied by her from memory, and with the assistance of her relations, is trustworthy. Indeed, as is natural enough perhaps under the circumstances, the hereditary nature of their affliction was well known to them, and had interested them long before they were questioned on the subject.

In the table the generations are marked A, B, C, etc., and the numbers of each generation according to seniority, 1, 2, 3, etc. Squares denote males, circles females; and the shading in either case is made in the cases in which cataract was known to exist.

In addition to the table, the following will be of use as a *résumé* of the particulars connected with each case so far as they could be ascertained :—

A.—Family name, Rae; cataract known to have existed in this family, but nothing definite known as to which member affected.

B₁ was eldest daughter of A's, but it is not known whether or not she had cataract.

B₂, place in family not known; certainly had not cataract. He had nine children, C₂ to C₁₀ inclusive, of whom the five eldest, two males and three females, C₂ to C₆ inclusive, had cataract. Two of those who had cataract, one male and one female, did not marry. Nothing else is known definitely as to the others who did marry, but it is supposed that, with the exception of those of C₂, their descendants were free from cataract.

C₂ married her cousin on the Rae side, whose name was Richardson, and who had not cataract. She died in 1827, aged 61. She had cataract from "near childhood to old age." Of her eight children, four, two males and two

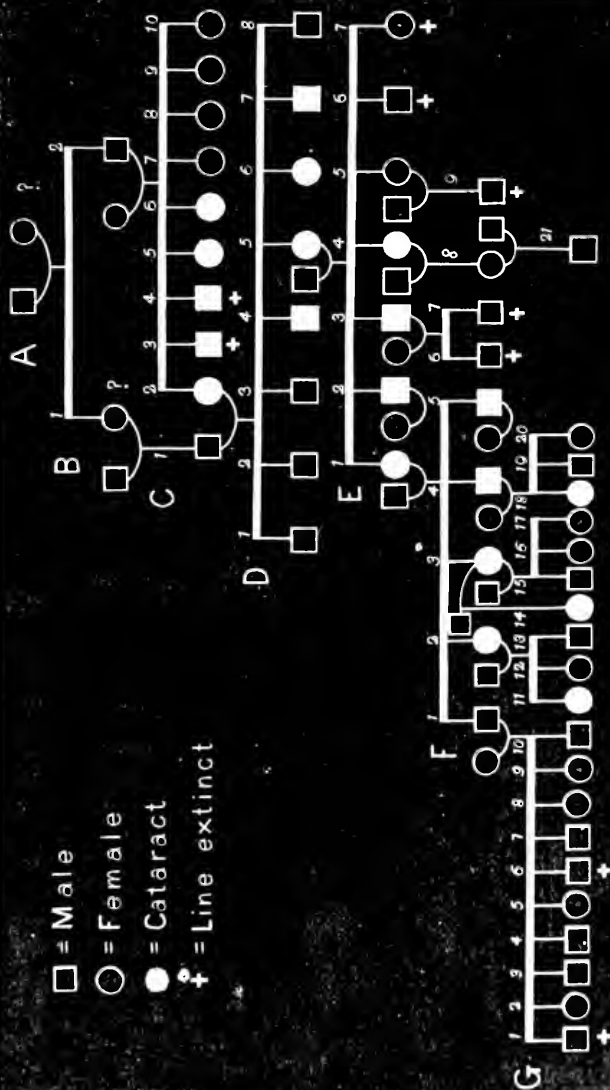
* Her present address is 53, Princes Street, Lochmaben, N.B.

□ = Male

○ = Female

● = Cataract

† = Line extinct



females, D_4 to D_7 inclusive, had cataract. Of their descendants, only those of D_5 could be traced.

D_5 , fifth child and eldest daughter of C_2 , and second in that family to have cataract, married a man, Johnston, who was no relation, and had no cataract. She, as well as the others of that generation, had her cataract "from infancy." She died about 1832. No information could be got as to the descendants of her brothers and sisters. Of her seven children, the four eldest, two males and two females, E_1 to E_4 inclusive, had cataract; the three youngest, E_5 , E_6 , and E_7 , had not.

E_7 , Janet Johnston, no cataract; did not marry; dead.

E_6 , John Johnston, no cataract; did not marry; dead.

E_5 , Elizabeth Johnston, had no cataract; married, and had one son, F_9 , who had no cataract, and is now dead.

E_4 had cataract, which came on at the age of seven years; she was operated on by Dr. Blacklock, of Dumfries. She had a daughter, F_8 , whose married name was Steel, who had no cataract, and had a son, G_{21} , now 12 years of age, also free from cataract.

E_3 , Charles Johnston, had cataract, which came on early in life, exact time not known. He was operated on in Glasgow Infirmary. He had two sons, F_6 and F_7 , neither of whom had cataract, and who are both dead.

E_2 , Mathew Johnston, had cataract, but it is not known when it came on; operated on in Glasgow Infirmary; married, but no family.

E_1 , Mrs. King (*née* Janet Johnston), had cataract from early life, and was operated on by Dr. Blacklock, of Dumfries. Her husband had no cataract, and there is known to have been no cataract in his family. She died August 7th, 1859, aged 42.

F_9 , Charles King, had cataract, which came on at the age of seven; was operated on by the late Dr. Benjamin Bell, of Edinburgh, in 1868; married, but no family.

F_8 , William King, had cataract, which came on at the age of seven, and was operated on by Dr. B. Bell in 1868; married a woman who had no cataract, and has three children, the eldest of whom, a girl, G_{18} , has cataract.

F_7 , Mrs. Easton, developed cataract at seven years of age;

operated on by Dr. B. Bell in 1868 ; twice married ; eldest daughter, and only child by first husband, G_{11} , has cataract ;¹ three other children, free.

F_2 , Mrs. Maxwell, cataract developed at 18 years of age ; also operated on by Dr. B. Bell in 1868 ; three children, but only one, eldest daughter, G_{11} , has cataract.

F_1 , James King, no cataract, 10 children, ages from 23 to 6, all free from cataract.

G_{11} , Janet Maxwell, aged 14 ; my case.

G_{14} , Jemima King (Easton) ; Dr. Robertson's case.

G_{15} , boy, aged eight ; no cataract.

G_{16} , girl, aged seven ; no cataract.

G_{17} , girl, aged three ; no cataract.

G_{18} , Mary Jane King, aged 11 ; developed cataract at age of nine. No operation as yet.

G_{19} , boy, aged eight ; no cataract.

G_{20} , girl, aged seven ; no cataract.

There were no further intermarriages in the family after that between C_1 and C_2 .

Out of 55 individuals belonging to five generations whose existence could be traced, 28 of whom were males and 27 females, 20 had cataract, 8 males and 12 females : a percentage of 44·4 of the females, and of about 28·6 of the males. The hereditary tendency was therefore more strongly marked in the females. There are five instances, too, in which transmission has taken place through the females B , C_2 , D_5 , F , F_2 , and F_3 , and always in the case of a female who herself had cataract. In one case transmission certainly took place through the male F_4 , who was himself the subject of cataract ; and in another, B_2 , this was highly probable, although he had no cataract. His ancestors, however, had.

The transmission is therefore shown to be much more strongly marked through the female than through the male, although the preponderance may not be so great as would appear from the table, owing to the impossibility of tracing the descendants of some of the cataractous members of the C and D generations.

It is true that those from C are believed not to have had cataract. As to those from D, nothing could be ascertained. In this respect of preponderance of transmission through the female, this hereditary history differs from most which have been published in connection with cataract. This may possibly be on account of the different nature of the cataract, these histories having had reference to senile cataract; while this form was one which always developed early in life. In true congenital cataract I have never found any evidence of heredity, so that in respect of hereditary predisposition the form under consideration might be looked upon as a kind of very early senile cataract, although, owing to the difference in the physical structure of the lens in childhood from that which obtains later on, its anatomical characteristics could not be the same.

No other disease besides cataract appears to have been transmitted at the same time. As to the state of the eyes, in the only cases, G_{11} and G_{14} , which I had an opportunity of examining, they appeared otherwise healthy. There was no myopia, and there were no ophthalmoscopic changes. There was, however, a considerable degree of amblyopia in G_{11} , $V = \frac{20}{50}$; in G_{14} , $V < \frac{20}{70}$.

A point of general rather than special interest in connection with heredity which strikes one on examining the accompanying table is the tendency which there has evidently been in every instance for the cataract cases to appear in succession; apparently showing a greater tendency to inheritance from the mother, as far as cataract goes at all events, at one particular time of child-bearing life than at others. Thus in the C and E generations the cataract cases all came first, and were followed by a number free from this defect; whilst in the D and F generations the tendency has asserted itself after the birth of children healthy as far as the lens is concerned. In no instance has the eldest girl escaped.

T. H. LEBER (Göttingen). History of the Glaucoma-Iridectomy. *Archiv. f. Ophth.*, Vol. XXXIII. 2; and *Revue Générale d'Ophtal.*, October, 1887, p. 431.

This paper is a dignified and severe reply to a recent publication by M. de Wecker, in which that eminent writer has attempted to minimise the honour of Albrecht von Graefe as the discoverer of a cure for glaucoma. Prof. Leber well says that the facts of this beneficent discovery are already historical, and that, for the well informed student of ophthalmology, no vindication of Von Graefe's merit is necessary; but when a perversion of the facts appears under a name so well known in the ophthalmic world as that of De Wecker, and appears, moreover, in the Archives which were founded by Von Graefe and bear his name, it becomes a duty to refute the attack, and to state once more the true history of the discovery. With this position, we believe, English readers will cordially agree, though the merit of Von Graefe needs no vindication in this country.

The substance of M. de Wecker's contention is as follows:—Mackenzie recognised the increase of tension in glaucoma, and, in 1830, recommended paracentesis of the eye-ball as a remedy for it. In the clinic of Desmarres, Von Graefe had the opportunity of observing the good effects of the operation of iridectomy, which was practised very extensively by the Parisian oculist. He was led in this manner to the idea of trying the effect of iridectomy in glaucoma also; not as the results of considerations based on exact observation, but as a trial at all hazard of the means so extensively used by his master; it was not his theory of the nature of glaucoma which led to this idea, for it was only after the accidental discovery of the remedy that he developed the theory.

Leber replies with a crushing array of acknowledged facts, and of quotations from Von Graefe's own writings.

Mackenzie unquestionably recognised the excess of pressure, but rather as a complication of the disease than as the fundamental cause of the leading symptoms. His attempts to relieve it by paracentesis of the vitreous yielded no satisfactory result. The views and therapeutic attempts of

Middlemore were nearly of the same nature ; they attracted little attention and remained unknown to Von Graefe.

Desmarres, though frequently performing iridectomy, himself declares, so De Wecker tells us, that he never tried it in glaucoma, and that he was ignorant of its efficacy as a remedy for increased tension of the eye.

In 1855, two years before the publication of his successes with iridectomy, and one year before the first trial of this operation in acute glaucoma, Von Graefe published his opinion that the amaurosis which is the sequel of acute glaucoma is attributable to the exaggerated intra-ocular pressure, and his resolution to employ energetically all those means which tend to diminish this pressure.

Although he at first fell into error with regard to the form of the papilla, believing that the change revealed by the ophthalmoscope was a protusion, not an excavation, he did not on that account abandon his theory as to the fundamental importance of the increased pressure ; he corrected his error, and found in the excavated papilla a further confirmation of the theory. He published this correction in 1855, before trying the operative measures which a little while later gave such brilliant results.

After having tried in vain every means supposed to have the power of lowering the intra-ocular pressure, atropine and paracentesis included, he was led by his own keen observation to the employment of iridectomy. He has himself related that it was, in the first instance, the utility of iridectomy in ulcerations and infiltrations of the cornea which led him to the idea that the same operation might reduce an increased tension. In this idea he was confirmed by the results of iridectomy in cases of partial staphyloma of the cornea and of the sclerotic. The treatment formerly employed in such cases was—firstly, the ablation of the staphyloma of the cornea ; and, secondly, the formation when necessary of an artificial pupil. Inverting the customary order of these two operations, for reasons not connected with the tension of the eye, Von Graefe noticed that after the iridectomy the staphyloma subsided and the second operation became unnecessary. He observed cases in which a partial staphyloma returned more than once after repeated

operation, until by means of an iridectomy the result previously sought in vain was permanently attained. Supported by these facts, and by this hypothesis, as he tells us in his own words, he felt himself justified in performing an iridectomy in a case of glaucoma. His first trial of iridectomy in acute glaucoma was made in June, 1856; in the following year, having convinced himself of the permanence of the results obtained by this procedure, he published his first account of it.

With regard to the effect of an iridectomy upon the tension of a healthy eye, Von Graefe at first held the opinion that here also the tension was reduced. This opinion, however, he expressed with caution, and afterwards abandoned. Again, with regard to the fact that not all cases of staphyloma are curable by iridectomy as above described, no one knew this better than Von Graefe himself; it is stated in his last great work on glaucoma.

Von Graefe gave no explanation of the tension-lowering power of iridectomy. He rejoiced that practice can make substantial progress by empirical methods; and while he looked forward to the day when a valid explanation of his discovery should be found, he declined to be turned from his path in the meantime by the uncertainty of theories.

Prof. Leber does not say, though he might have done so, that his own discovery of the excretory function of the angle of the anterior chamber has led the way to that fuller understanding of the subject which before was impossible.

P.S.

HIRSCHBERG (Berlin). On Primary Optic Neuritis.
Centralbl. für Prakt. Augenheilk., Nov., 1887.

On April 9th, 1887, Hirschberg was consulted in regard to a lad aged fifteen, who, otherwise healthy, complained of sudden loss of vision in the right eye. This eye squinted inwards, had done so for a long period, and was hypermetropic to 55D. Ophthalmoscopically, it showed only slight obscuration of the disc, so that it might have been readily supposed that the condition had existed previously, and only been suddenly discovered. The boy's history,

however, was very definite, and the vision of right was reduced to fingers at 1'; the visual field, fairly extensive as to limits, had a large central scotoma, and the globe was tender on pressure.

Hirschberg diagnosed optic neuritis, and ordered potass. iodid. and diaphoretics with sod. salicylat. He divides the disease into three stages: the first and shortest, characterised by great visual disturbance, with slight ophthalmoscopic appearances; the second, longer, by diminution of the visual disturbance and more marked inflammation at the disc; and the third, prolonged, by almost complete recovery of vision, with marked pallor of the disc without inflammatory blurring. Hirschberg has seen several of these cases, and considers their course very typical. They are chiefly women, yet he has been able to discover no evident connection of the disease with the sexual function. The interval before the second eye is attacked, may be days, or weeks, or months.

In the second stage of the disease, as above stated, the vision begins to recover, and this often rapidly, so rapidly that it cannot be attributed to treatment. Occasionally, however, the eye becomes absolutely blind, and no treatment has the slightest effect.

On the 10th of April, *i.e.*, six days after the first examination, vision had recovered to fingers at 10', and letters of Sn xii. at 4". The visual field had extended, but a scotoma of about 20° in each direction persisted. A finely streaked blurring surrounded the disc, and gradually increased as the vision improved, until the three nasal quadrants of the disc and their neighbourhood were markedly streaked, and also dotted with fine glancing points.

In the third stage, commencing in June, the vision had still further improved, and the scotoma had diminished to 4°; but the disc had become paler, and the streaking and dotting of the retina had disappeared. Ultimately, with a slightly-blurred greenish-white disc, such as is seen in complete blindness, vision was Sn xx at 15', with + 2.75D,^{*} and only a small scotomatous point persisted.

* The size of the retinal vessels is not mentioned, an important point in all such cases.

As showing the variable period at which the second eye may become affected, Hirschberg relates the following three cases, all female :—(1) Fräul. M. O., aged 42, an artist, troubled with chronic articular rheumatism, suddenly lost the sight of the right eye two days before. It had improved in the interval, and had Sn CC at 15', and Sn xiii. at 8." The visual field was of normal extent, but showed a central scotoma of 5° to 20°. Ophthalmoscopically, there was swelling round the disc. The arteries were free (no cardiac disease). Six days from the beginning of the attack the right was well ; but now the left eye was attacked, was painful on movement and pressure, and showed well-marked optic neuritis, with vision deficient and a central scotoma. Under potass. iodid. both eyes slowly recovered vision, and the scotomata disappeared, till three weeks after the first attack the patient had normal vision except for colours, and the fundi were normal. (2) Frau M. B., aged 20 years, had slight temporary loss of vision in the right eye three weeks before coming under observation for loss of vision in the left, which came on eight days before. There was no history of syphilis. The fundi were normal, vision of right Sn LXX at 15', while left had only fingers at 4', with large central scotoma. Four months later the patient came with the right eye similarly affected. The left had by this time practically recovered, although the nerve was very pale. Improvement set in in the right eye before the remedies—potass. iodid., hydrarg. and diaphoresis—had time to take effect. (3) A peasant girl, aged 17 years, had her right eye attacked in 1878, recovered, and in 1884 had her left eye attacked, which likewise recovered. Hirschberg has already recorded this case.

In all such cases, Hirschberg points out that affections of the yellow spot must, by observation with dilated pupil, be excluded ; and he also notes that a central scotoma in an eye which subsequently becomes blind, shows an affection of the sheath of the nerve extending into its substance, not as in former years would have been supposed before the course of the macular fibres was known, a central inflammation extending outwards.

HIRSCHBERG (Berlin). On Leukæmic Retinitis.
Centralbl. für prak. Augenheilk., April, 1887.

In this case the diagnosis of the disease was made from the ophthalmoscopic appearances; and while Hirschberg practically states that this will be exceptional, still he criticises the absence of the description of this retinitis from Ziemssen's Handbuch.

The patient, a railway servant, aged 31 years, came on account of a subjective visual sensation. For five days he had with the right eye seen a dark balloon-like figure on white paper. This figure seemed on a white light to be red, and on a green light blackish. A central hæmorrhage was diagnosed and found, but, in addition, both retinæ were studded with numerous minute hæmorrhages, some with clear white centres. The central hæmorrhage was really balloon-like. The retinal condition varied, getting better and worse; but a month later an appearance, exactly similar to that in the right, now occurred in the left eye, and a similar globular hæmorrhage was found. The discs now became blurred, the veins surrounded by a white margin, and white patches appeared in the retina, occasionally surrounded by margins of blood.

The patient had had syphilis 13 years before, with secondary symptoms. His spleen was enlarged, and this enlargement was progressive, notwithstanding treatment (potass. iodid, quinine and iron). There was no glandular swelling, but the bones were tender. On examination of the blood the white corpuscles were found about equal in number to the red.

As Hirschberg says, the case is of interest from the fact that the visual sensation was the first symptom complained of, and that the ophthalmoscope led to a diagnosis.

J. A.

LANDOLT (Paris).—On Operative Treatment of Strabismus. *Archives d'Ophthalmologie, Sept.—Oct., 1887.*

Strabotomy as an operation stands alone, and cannot be brought into comparison with other operations on the

eyes. All these, though apparently very dissimilar, have one feature in common: they concern only one eye. An operation for strabismus, on the contrary, concerns both eyes, inasmuch as strabismus is a binocular affection. This should never be lost sight of. In an operation for cataract we need take no heed of the fellow eye, but in strabismus the condition of both eyes, as regards their position and motility, must be equally studied.

In our attempts to cure strabismus by surgical means there are certain factors which we can call to our aid, those conditions, namely, which conduce to convergence or divergence; of these, the most important and most potent is the desire for binocular vision. Equal sight in the two eyes and harmony in their function are the most favourable conditions for binocular vision, and attempts should be made to attain this result by correction of errors of refraction and exercise of the ocular muscles.

Professor Landolt's method of proceeding in a case of strabismus is as follows:—The nature of the squint, paralytic or concomitant, is determined; its degree is ascertained by angular measurement; the field of fixation is mapped out, at least in the plane of deviation; the amplitude of convergence and accommodation, as well as the refraction and the visual acuity, are determined. If possible, the date at which binocular vision was lost should be ascertained, and also whether diplopia can still be produced by prisms, the deviating eye having been placed in as favourable conditions as possible by correction of its ametropia, the use of a coloured glass before the other eye, etc. If the patient be young, every means at command which may diminish the squint should be used before proceeding to operate. In *convergent* strabismus, all work requiring accommodation for a near point should be stopped, the eyes atropinised, the total amount of hypermetropia corrected, and, if feasible, stereoscopic exercises regularly practised.

Our means of remedying *divergent* strabismus without operation are less efficacious; nevertheless, if the condition be due to general or local muscular weakness, tonic and gymnastic treatment may render good service. Untor-

tunately we cannot hope for assistance from the most natural means of opposing the onset of this form of squint, *i.e.*, the act of convergence. This act is constantly either performed or attempted, and if, in spite of it, divergent strabismus develop, nothing short of operative measures will enable the eyes to regain their normal position ; but I never operate for strabismus (Professor Landolt remarks) until I am convinced that I have obtained all possible help from these methods of " pacific " treatment ; and having done so, and, by their use having reduced the degree of deviation, the operation most suitable to the remaining squint must be performed.

If a squint of 30° has thus been reduced to one of 20° , operative treatment may be safely adopted. Now, is it possible to say that we can operate with such precision that the squint of 20° will be exactly corrected, and that neither too great nor too little an effect will be the result ? Assuredly not. Our operative procedures, no matter how skilfully we perform them, are so clumsy in comparison with the delicacy of function of the ocular muscles, that if we trust to them alone we shall certainly meet with failure. We can say, however, that in certain cases simple tenotomy is indicated ; in others, advancement of a tendon ; in others, again, tenotomy of one muscle, combined with advancement of its antagonist. Simple tenotomy will not correct a convergent strabismus of 20° ; and in such an instance there is a choice of two methods of treatment : (1) division of both internal recti ; (2) division of the internal and advancement of the external rectus of the same eye.

Landolt advises recourse to the former method, if the squint be alternating ; to the latter, if it be constant. If, a few days after operation, some divergence be present, atropinisation should be relinquished, and the patient be allowed to use the eyes ; the natural tendency to converge will then aid in restraining the outward deviation. When, in spite of this, the eye still deviates, a slight advancement of the tenotomised muscle is preferable to division of the tendon, which has been re-adjusted.

Divergent strabismus is much less easily dealt with ; and more care should be taken not to produce an over correction by operative means. Before deciding on the mode of treat-

ment, not only must the degree of deviation be ascertained, but also the power of the abductor and adductor muscles. Examination of the field of fixation will often reveal a considerable limitation of inward movement, and this not only in the squinting eye. This is not surprising. Binocular vision is rapidly lost in divergent squint, and the internal recti, but little exercised by lateral movements of the eyes, are still less used for convergence, the function which in their normal condition gives them a preponderance over the abductors.

If the divergence be of low degree, *e.g.* 10° , and the field of fixation of each eye reach at least 47° inwards, a single tenotomy may suffice; if not, tenotomy of the external rectus of the second eye should be performed. In cases in which the divergence is of long standing and high degree, and the field of fixation is greatly limited inwards, tenotomy of the external, with advancement of internal rectus, is urgently called for; and it may be necessary, in order to complete the cure, to perform a similar operation on the second eye. Before having recourse to the second operation, the means at our disposal to increase or induce convergence should be tried. No atropine should be used; only the eye operated upon should be bandaged, if tenotomy have to be performed, and both eyes (when advancement of a muscle has been done) only for two days. The uncovered eye will then, during its movements, have the effect of inducing similar action in the muscles of its fellow, which should be kept covered till the re-adjusted tendon has become attached to the sclerotic at its new insertion.

This after-treatment, in cases of re-adjustment for divergent squint, is not quite in accord with that usually adopted by British operators, the majority of whom, we believe, prefer to keep both eyes bandaged for some days after the operation.

J. B. L.

ULRICH (Strassburg).—On Retinal Hæmorrhages in Anæmia and the Intra-ocular Pressure in Hæmorrhage and in Quinine and Chloral Poisoning. *Gräfe's Archiv für Ophth.*, 1887, *Abth. II.* pp. 1—46.

It has been known for several years that neuro-retinal changes, with partial or complete blindness, occur as a result of general hæmorrhages, more especially, as Fries has shown (Gowers' *Med. Ophthalmoscopy*, 1st Edition, p. 184), in hæmorrhages from the gastro-intestinal tract, from the uterus, and after venesection. The cause of these changes is doubtful, and even the observation of them imperfect. They do not always arise immediately after the hæmorrhage. In the few cases observed from the beginning there has been neuro-retinitis of varying, but usually slight, intensity, with or without hæmorrhages, and resulting in partial or complete recovery; but occasionally in absolute blindness, with complete optic atrophy. The recovery in cases of gastric hæmorrhage has apparently rarely been complete.

In 1883, Ulrich published (*Klin. Monatsblätter für Augenheilk.*) the account of a case of hæmorrhage from a gastric ulcer in a girl aged 25 years, with an ophthalmoscopic appearance previously unrecorded. Seven days after hæmorrhages which had caused marked anæmia, the fundi, apart from pallor, were found normal. Two days later another hæmorrhage occurred, during which the patient fainted, and ten minutes later the discs were found extremely pale, sharply outlined and slightly cupped. The arteries were narrow and difficult to follow to the periphery. The veins were normal or slightly distended, but this only to the edge of the disc, where they *suddenly lost their dark red colour and became bright red*, as if the veins were continued into arteries. Close to the disc were numerous retinal hæmorrhages, some with clear centres, and many surrounding large veins. There were also numerous white spots. The macula was very distinct and dark, with white streaks extending radially from it, at a greater distance than in albuminuric retinitis. The patient could count fingers, but no accurate examination as to vision was possible. Gradually

the peculiar condition of the veins disappeared, and two months later the fundi and vision were normal. Horner, in a man aged 45, under the care of Nägeli, observed the same condition of veins, nine days after severe hæmatemesis from gastric disease. The patient was practically blind, with cloudy, white, slightly swollen discs, and fine white spots between the disc and macula, which latter appeared as a large cherry-red spot. Ocular tension was -1, and the slightest pressure on the globe completely emptied the veins on the disc, and produced first pulsation and then emptying of the arteries. The patient continued almost blind (hand reflex ?).

Ulrich now records three more cases with the same appearances: two in girls aged 22 years with gastric ulcer, both of whom recovered with normal vision; one in a girl aged 21 years, suffering from pernicious anemia, with latterly epistaxis and hæmorrhage from the bowel. The fundi in the last case remained normal till ten days before death, when the above described condition appeared, with several small hæmorrhages having clear centres.

He explains the appearances by these four propositions:—

(1). A deficient filling of the vascular system and a reduction of blood pressure in cases of hæmorrhage.

(2). The assumption of a hindrance to the circulation at the bend of the retinal veins as they pass over the edge of the disc.

(3). An increase of this hindrance through the influence of the intra-ocular pressure.

(4). An abnormal translucency of the blood in the cases under consideration.

That this last is not the sole cause of the symptoms Ulrich implies from the frequency of severe anemia in girls without this appearance. The effect of pressure on the globe, as above mentioned, gives considerable support to the above propositions, but, from the risk of inducing retinal hæmorrhage, Ulrich did not venture to apply it in the acute stage of the affection, and he therefore proceeded to test his theory by physiological experiment.

He refers, in the first place, to certain observations by

Brunner (*Inaug. Dissert., Zürich*), confirmed by Horner, on the fundus of the dog in quinine poisoning. Marked ischæmia of the retinal vessels has been repeatedly observed in quinine poisoning in man, and Brunner states that he has produced a similar condition in the dog, but has failed to produce it in the rabbit and cat. In his dissertation he describes the appearances in the dog as follows:—"The ophthalmoscope shows distinct evidence of ischæmia of retinal vessels. In the portions of the veins on the papilla I could see remarkable movements. The end of such a portion became suddenly pale, almost bloodless, and sharply pointed towards the centre of the papilla; then it widened with the entrance of a red blood column, the pointed end becoming momentarily broad and blunt, then again pointed. These movements were tolerably slow, without distinct rhythm." The slightest touch on the globe, even the closure of the lids, would empty the vessels on the papilla, and Horner states that the retinal arteries were scarcely visible. Of these appearances Brunner gives the same explanation as Ulrich, and suggests the thoracic aspiration as the cause of the irregular non-rhythmical emptying of the veins. Ulrich repeated and confirmed his results, but considers that the convulsions produced by the drug are the cause of non-rhythmical movement, and this he proved by experimenting with chloral hydrate in place of quinine. Chloral hydrate, like quinine, reduces the blood pressure, but, producing no convulsions, it causes no irregular emptying of the retinal veins, as in quinine poisoning. In these chloral experiments, and also in lowered blood pressure by blood letting, Ulrich found that the annulus venosus surrounding the papilla in the dog was paler than normal, and that the slightest pressure on the globe would empty it.

The bend in the central vein therefore, Ulrich holds, is a hindrance to the circulation; a hindrance which is less readily overcome by a blood stream of low tension, and is increased, on the other hand, by intra-ocular pressure. Under this head he refers to the spontaneous or readily-induced pulsation of retinal arteries in glaucoma, in the algid stage of cholera, in fainting, and in anæmia. He does not mention the contrast between the retinal pulsation of glaucoma and

that of aortic regurgitation (Nettleship's *Dis. of the Eye*, 4th Edition, p. 399), which strongly supports his contention. With regard to the fall of intra-ocular pressure during hæmorrhage, he records numerous manometer experiments, which prove that in the cat, during a moderate blood-letting (corresponding in an average man to one litre of blood), the intra-ocular pressure fell but slightly, while the blood pressure fell markedly. Hæmorrhage, therefore, produces a condition most favourable to blood stagnation in the retinal veins. In copious blood-letting the intra-ocular pressure also fell markedly, but the result was generally fatal.

As an interesting point observed by Ulrich during his chloral experiments, it may be noted that the atropine mydriasis previously induced either partially or entirely disappeared, to reappear again when the animal recovered from the narcotic. In chloral poisoning, both the blood-pressure and the intra-ocular pressure fall, but neither of these seems to explain the disappearance of the atropine mydriasis; for by the injection of helleborin, Ulrich raised the blood pressure markedly, and probably also the intra-ocular pressure, but the pupil remained unaltered in its contraction till the animal recovered from the narcotic, when it again expanded.

J. A.

BOEHM (Breslau). The Diagnosis of Astigmatism by means of a Quantitative Estimation of Colour Sense. *Klin. Monatsbl. für Augenheilk.*, Nov., 1887.

Dr. Boehm publishes the results of experiments which he undertook at the suggestion of Dr. L. Wolffberg (in whose clinique Boehm was working) to ascertain the value of this method as a means of diagnosis between defect of visual acuteness due simply to errors of refraction, and that resulting from disease of the light percipient organs. Dr. Wolffberg had previously published the results of his own observations,

* *Klin. Monatsbl. für Augenheilk.*, 1886, p. 359. These tests, in the form of a book, can be obtained from E. Sydow, 13, Albrecht Strasse, Berlin.

and had constructed the following table. In this table r^2 and r^7 signify red circles of 2 and 7 mm. diameter, and bl^7 and bl^{18} , signify blue circles of 7 and 18 mm. diameter respectively.

Table of the acuteness of vision and quantitative colour sense in anomalies of refraction.

VISUS.	REFRACTION.	
	r^2	bl^7
5/5	$5\frac{1}{2}$	$5\frac{1}{2}$
5/6	5	5
5/8	$4\frac{1}{4}$	$4\frac{1}{4}$
5/10	$3\frac{3}{4}$	$3\frac{3}{4}$
5/12	$3\frac{1}{4}$	$3\frac{1}{4}$
5/15	3	3
5/20	$2\frac{1}{2}$	$2\frac{1}{2}$
5/30	$2\frac{1}{4}$	$2\frac{1}{4}$
5/50	2	2
	r^7	bl^{18}
$4\frac{1}{2}/50$	$4\frac{1}{2}$	$4\frac{1}{2}$
4/50	4	4
3/50	3	3
2/50	$2\frac{1}{2}$	$2\frac{1}{2}$
1/50	2	2

The acuteness of vision is first tested by Snellen's test types, and is found to be up to or below the standard; the surgeon then proceeds to ascertain at what distance the discs r^2 and bl^7 , or, if vision be less than 5/50, the discs r^7 and bl^{18} are recognised. Now if this distance be the same as that in the right-hand column of the table, corresponding to the ascertained acuteness of sight, the defect of vision is due to an error of refraction, which can be fully corrected by spherical lenses. If the colour sense be higher than that given in the table, astigmatism is present. For example, if $V=5/10$ and r^2 bl^7 are recognised at a distance of $3\frac{3}{4}$ metres, we have to deal with simple myopia or hypermetropia. But if

with the same visual acuity the discs be recognised at $4\frac{1}{2}$ metres, the error of refraction is astigmatism. If the discs be recognised only at 3 metres, the defect of sight is due to other causes than ametropia.

The value of this test depends entirely on the accuracy of these tables, and Boehm's experiments support Wolffberg's original observations in a striking manner. He tabulates the cases he examined, dividing them into groups:— (1) myopia, 9 cases; (2) hypermetropia, 7 cases; (3) astigmatism, 31 cases, including simple and compound myopic and hypermetropic, and mixed astigmatism; (4) emmetropic eyes rendered myopic and hypermetropic by means of convex and concave lenses, and astigmatic by means of cylindrical lenses.

In almost every instance the results obtained corresponded very closely with the figures given in Wolffberg's tables.

These experiments, which appear to have been conducted with great care, seem to entitle this method of testing vision to a fair trial by ophthalmologists, to whom it may be of real value, as a ready means of ascertaining whether an apparent gross defect of vision is or is not wholly due to errors of refraction.

J. B. L.

CHARCOT (Paris).—Ocular Symptoms in Insular Sclerosis (Sclérose en plaques) and in Ataxy.
Rec. d'Ophtal., Nov., 1887.

The ocular symptoms which may be present in insular sclerosis are of considerable importance as regards diagnosis, and an instructive comparison can be drawn between them and those met with in locomotor ataxy.

In ataxy the ocular muscles, the pupils or the optic nerve, are affected. One of the most common motor disturbances is paralysis of the external rectus, or of the muscles supplied by the third nerve—symptoms which were formerly almost invariably thought to be of rheumatic or

* In the London Medical Record, December, 1887, is an able *resume* of both Wolffberg's and Boehm's papers, by Mr. W. Adams Frost.

syphilitic origin. Though a similar condition may be present in disseminated sclerosis, if the nerve trunks to these muscles become involved, nevertheless it is an extremely rare occurrence, and one upon which no great stress need be laid. What we do find in disseminated sclerosis, and not in tabes, are paralyses, whose cause must be sought in lesions of the central nuclei. These are not peripheral paralyses, such as occur in ataxy, but lesions whose objective signs are defects of co-ordination shown by paralysis of the associated movements of the eyes: when looking to the right or left, the margin of the cornea fails to reach the inner or outer commissure, or there is an appreciable lagging in the rotation of one or other eye. The earliest symptom of this condition is an inability on the part of the patient to fix an object with precision, and a consequently vague look. Oscillatory movements of the eyes occur, closely allied to those of nystagmus, and at first there may be slight diplopia. True nystagmus at length supervenes, and is of almost pathognomonic significance; it is, however, sometimes, though rarely, met with in the hereditary ataxy of Friedreich.

A study of the alterations in the movements of the iris is chiefly valuable in relation to ataxy. Frequently in tabetics extreme myosis is found, or in some instances one pupil is pinhole in size, while the other is dilated. A patient who presents this latter condition can be suffering from only two diseases—tabes dorsalis, or general paralysis of the insane. A more important indication, however, is that known as the Argyll-Robertson pupil, under which name are included two conditions: (1) the pupil, which may be dilated or contracted, shows no reaction to light; (2) in association with convergence and accommodation, well marked contraction of the pupil occurs, even in cases of extreme myosis. It is this contrast between its action to light and with accommodative efforts which constitutes the Argyll-Robertson pupil. In disseminated sclerosis this sign is absent. A myotic pupil will still contract, though slightly, under the influence of light, and dilate when shaded, and its action to light and with accommodation will be equally good. Careful observation of the pupil alone may thus, in

certain cases, lead to a diagnosis between these two diseases.

Examination of the fundus oculi will also materially assist. In *tabes* the amaurosis is decided, and due to an atrophy of the optic nerve, with characteristic ophthalmoscopic appearances. This atrophy is frequently the first sign of ataxy, and many patients come under observation for failure of sight long before they seek advice on account of the other symptoms of their complaint.

In disseminated sclerosis, amaurosis may also be present, but it is unaccompanied by ophthalmoscopic changes, save a simple pallor of the papilla. It is, moreover, generally a transitory defect, which may persist for five or six months, and then disappear. The recovery of sight is explicable by the fact that in the lesions of disseminated sclerosis, the axis cylinders are not destroyed, and the functions of the affected nerve may be re-established. It is essential to remember, however, that in exceptional cases the blindness becomes permanent.

In *tabes*, again, there are certain special features which accompany the loss of sight. There is from the out-set a contraction of the field of vision, and this contraction is not truly concentric, as in hysteria, but irregular by reason of the existence of scotomata. A peculiar achromatopsia also presents itself, consisting of a defect for blue and yellow. There are no analogous symptoms in disseminated sclerosis, except that sometimes a contraction of the visual field, similar to that in hysteria, is present, and which may be explained by the similarity in some respects of the two maladies and, in certain cases, by their actual co-existence.

Independently of the classical form in which it is now well known, disseminated sclerosis of irregular types may be met with, and be extremely difficult of diagnosis; or after, perchance, only one symptom has been evident, the disease may, with all its usual phenomena, rapidly develop. The same is true of locomotor ataxy, which, in the short period of fourteen days, may reach its third stage.

A symptom which peculiarly belongs to disseminated sclerosis (more than all other cerebro-spinal affections) is the liability to remissions of several months' duration, so complete

that the hope of a cure may become established, and, indeed, these remissions may be so prolonged that they become almost equivalent to recovery. In this, as in other respects, we see a curious analogy between disseminated sclerosis and hysteria.

These abnormal cases of insular sclerosis become still more difficult of diagnosis where then is present but one commonplace symptom, suggestive of some other affection, such as spastic paraplegia ; at times, moreover, the irregularity of gait gives rise to some doubt. Of this we have had numerous examples in La Saltpetrière. One such, a female patient, was in the hospital, under the care of Dr. Béhier, in 1868, at a time when the disease was first described. Albeit, she has since had three or four apoplectiform attacks, and has been blind for a period of six months, her condition has slowly improved, and, though she has now a vacant expression and a scanning speech with slight tremors, she is in a very satisfactory state. Another female patient, in whom disseminated sclerosis manifested itself in 1876 during an attack of acute rheumatism, at the present time suffers only from a moderate degree of nystagmus, some impediment in speech, and slight spastic paraplegia. Yet, in this case, the tremors were at one time excessive, and the prognosis gloomy in the extreme.

Spastic paraplegia should always raise a suspicion of disseminated sclerosis ; it is, nevertheless, a symptom of other diseases, particularly hysteria and transverse myelitis. There is another and unusual form in which insular sclerosis occasionally appears, viz., by an attack of hemiplegia, coming on slowly or suddenly, with transient or permanent paralysis. The following case is a good example :—A female patient, aged 36, became affected four years previously with right-sided paralysis, simulating an ordinary hemiplegia in its sudden onset with loss of consciousness, and other usual symptoms, and it may be asked why the case was not diagnosed as such. There were, however, certain peculiarities in this patient and her family history which deserved attention. Her father died in an apoplectic attack ; an aunt had senile tremors ; another committed suicide ; an uncle and his son both killed themselves ; another uncle died from apoplexy ; and there

were some male and female cousins insane and hysterical. She herself had attempted suicide, and had suffered from hysterical attacks ; and when aged twenty-one, she had, after violent emotions, an attack of paraplegia, which confined her to bed for two years. From this she completely recovered, and six years later married. In addition to the paraplegia she had had attacks of vertigo, even when in bed, diplopia, and probably nystagmus and tremors.

When she came under observation with hemiplegia, there was also noticeable scanning of speech, a vacant look, and a constant nystagmus, and when questioned, she clearly indicated that at the date of the onset of right hemiplegia, she had had ptosis of the left upper eyelid ; this coincidence is met with, it is true, in cerebral hæmorrhage, but when this is the case death rapidly supervenes. Moreover, both lower extremities had been paralysed, a condition very exceptionally met with in cerebral hæmorrhage, and which is then indicative of an incomplete decussation of fibres ; the use of the limbs is then permanently lost, whereas, in this instance, the left leg completely recovered. When we mention, in addition, the slight tremors, and the attacks of vertigo, it is evident that the hemiplegia in this case, though resembling at first sight an ordinary case, differs in many respects. It is, in fact, a hemiplegia in disseminated sclerosis, and the distinction is important ; for, whereas ordinary hemiplegia, if lasting for a certain time, remains incurable, and is followed by secondary degeneration, the hemiplegia of disseminated sclerosis may eventuate in perfect recovery. J. B. L.

PARINAUD (Paris).—On Ocular Cephalalgia. *Rev. d'Ophthal., Dec., 1887.*

The author divides all cases of headache arising from use of the eyes in two chief classes : (A) *ocular cephalalgia*, properly so called ; (B) *neuro-ocular cephalalgia*. Class A includes all cases in which the muscular apparatus of the eyes is at fault, and two sub-divisions naturally suggest themselves : (1) Cases in which there is defect of the internal recti (*muscular asthenopia*) ; (2) cases in which the ciliary muscle is more or less incapable (*acommodative asthenopia*).

In both conditions attempted sustained use of the eyes gives rise, among other symptoms, to headache, usually supra-orbital or frontal, but often becoming rapidly general, which lasts a varying time after the cessation of work. In muscular asthenopia the pain is frequently preceded by a sensation of fatigue, which patients compare to the tired feeling following great muscular exertion, and which they localise in the inner side of the eyeballs. At other times there is an ill-defined *malaise*, or a feeling of tension or pressure in the orbits, and in certain cases nausea and vertigo.

Parinaud includes in class B all cases of asthenopia or cephalalgia produced by use of the eyes, in which neither hypermetropia, astigmatism, nor insufficiency of the internal recti can be found. The cause, he thinks, rests with the nervous system. Hysteria, neurasthenia, adolescence, excessive mental application, and an arthritic diathesis are mentioned as conditions in which neuro-ocular cephalalgia is met with. The cephalalgia of adolescence, which has been investigated by Keller and Blache, occurs between the ages of fifteen and eighteen, and is more frequent in males than females. The pain in these cases is peculiarly frontal, and sometimes localised as two painful points at the roots of the eyebrows. Use of the eyes always intensifies the pain. Correction of any error of refraction which may be present has but little effect, and the only successful treatment is complete rest of the eyes, and improvement of the general health.

J. B. L.

VAN DUYSE (Gand). A Case of Coloboma of the Macula. *Annales d'Oculistique*, Vol. XCVIII, Sept.—Oct., 1887.

MAGNUS (Strassburg). A Case of Bilateral Congenital Microphthalmus, with Coloboma of the Right Optic Nerve. *Klinische Monatsblätter für Augenheilkunde*, Dec., 1887.

The patient, a man æt. 39, came under Van Duyse's care in June, 1887, with failure of sight of some weeks' duration. The symptoms were those of a typical case of toxic

amblyopia, and the patient drank to excess and smoked moderately. On examination of the right eye, a relative central scotoma for red was found, the field of vision being of normal extent. In the left eye the central scotoma was of greater extent, and its limits less easily determined. The field of vision in this eye was not taken, and apparently no ophthalmoscopic examination was made at the first visit. Two months later the patient was seen again, and further examination made. Dietetic and medical treatment had been strictly carried out in the interval. His acuteness of vision had greatly improved, and in the right eye the central colour scotoma had entirely disappeared. The temporal part of the O.D. was decidedly pale. In the left eye the O.D. presented only similar changes, but in the macular region of the retina the following appearances were observed, which closely resemble those already described* by the author in two cases:—At the posterior pole of the eye, distant from the temporal border of the papilla $2\frac{1}{2}$ disc-breadths, is a large oval excavated area, whose long diameter is horizontal. A tangent drawn from the lower border of the disc passes through the middle of this area, which is, horizontally, twice the diameter of the O. D., and, vertically, a little less than this. Its general appearances are not unlike those of a glaucomatous optic disc; on the temporal side it has an overhanging border, round which the vessels which pass from the coloboma into the retina, and *vice versa*, bend sharply; and surrounding it, almost completely, is an irregular narrow ring of atrophied choroid. The floor, which is bluish white, slopes from above downwards and outwards, the excavation being deepest in the outer and lower parts. Near its centre is a small nipple-like prominence, on the summit of which is a darkly pigmented patch. At this point the refraction is H. 1.5 D., whereas at the temporal side of the floor of the coloboma it is My. 1 D., and on the retina close to the border H. 1 D.

Perimetric examination of the left eye revealed concentric contraction of the field of vision, and, in addition, an ill-defined annular scotoma, absolute for colours, relative for form, which apparently indicates that certain of the

* Annales D'Oculistique, xci. p. 5, and xevi. p. 139.

retinal elements in the coloboma, perhaps on the prominent part mentioned above, retain their function in some degree.

Magnus records this case chiefly on account of the coloboma, of which he gives a coloured plate. The subject was a healthy woman æt. 65, who complained of recent failure of sight. Both eyeballs were exceptionally small, the corneæ measuring only 8 and 7 mm. in their transverse and vertical meridians respectively. The lenses showed commencing cortical cataracts. In each eye, $V = \frac{1}{3}$. Refraction Hypermetropic, T.n.

In the right eye the appearances at the optic disc were as follows (the description throughout is of the *inverted* image):—

At first sight the papilla looked about three times its normal size, but on careful examination it became evident that the disc proper was a small white circle, in a large grey, nearly round area, the edges of the two circles coinciding only at the nasal side; much as a sixpence would look if placed on a half-crown piece, and touching its margin at only one side. The large area was deeply excavated, the nasal side formed by the O.D. sloping gradually, while the outer wall was steep and more deeply excavated. The upper and lower, and especially the outer margins of the optic papilla were very indistinct, and on a considerably deeper level than the inner edge, the latter being flush with the choroid; but beyond the temporal edge of the disc, there was still deeper excavation.

The retinal vessels (considered as converging to the disc), on reaching the sharp outer and upper and lower border of the coloboma, bent abruptly over the edge, just as in a glaucomatous excavation, and almost entirely disappeared, only a faint red line marking their course; they subsequently came into view again, and ascended on to the outer edge of the disc proper, over which they curved, to dip again into the centre of the nerve. Those coming from the upper side and the upper-inner and lower-inner part showed a slight bend at the edge of the excavation, but did not become obscured; the up-in and down-in vessels appearing to bridge across a narrow hollow between the edge of the coloboma and the margin of the disc. A narrow ring of atrophied choroid

with an irregular toothed edge, surrounded the optic nerve entrance almost completely, being of greatest width on the temporal side.

J. B. L.

E. JACKSON (Philadelphia). Gleditschin, Spurious and Genuine ("Stenocarpine"). *Transactions of Philadelphia County Medical Society. Paper read November 3rd, 1887.*

In the OPTHALMIC REVIEW for September last, we noticed a paper in which Dr. Jackson called attention to a supposed new local anæsthetic, to which the name *stenocarpine* had been given. In that paper he expressed the belief that the name did not indicate the real source of the drug, and suggested that the tree *gleditschia triacanthos* corresponded better with the description given. It appears that those who were attempting to push the sale of the drug were good enough to accept this suggestion and identify the tree in question with that which yielded their "new local anæsthetic." The reputed two per cent. solution was sold and experimented with in various quarters, until the fraud was exposed in two directions at once.

Analyses of the solution showed that it was more nearly of the strength of 6 per cent. than 2 per cent.; and, further, that it contained cocaine and a member of the atropine group—probably, according to Jackson, hyo-cyamine, duboisine, or daturine. To make the matter more certain still, Jackson obtained and experimented with leaves of the tree which had been "fully identified as the source of the stenocarpine," and found them inert. He ascertained further that an alkaloid, properly called *gleditschin*, was obtained ten years ago from the fruit of the tree in question, and its properties carefully investigated by the late Dr. Lautenbach. The veritable gleditschin, though possessing certain marked narcotic properties, when applied to the conjunctiva produces no anæsthesia of that membrane and no dilatation of the pupil.

This attempt at fraud has fortunately been exposed so quickly that its only result is the discredit which will cling to its originators.

P. S.

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CAN OVERUSE OF THE RETINA CAUSE ORGANIC DISEASE AT THE FUNDUS? *

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We are often asked whether excessive use of the eyes can cause disease? It seems therefore worth while to inquire, even if the result of the inquiry be to a large extent negative, whether isolated attacks of organic disease at the fundus can be produced, or relapsing or progressive disease initiated, by use, which, relatively to the actual condition, is excessive either in time or degree.

I do not refer to the question of myopia, nor to the effect of reading and such-like work, in exciting an attack of glaucoma, or a relapse of iritis, or of phlyctenulæ in eyes predisposed to those diseases. Nor can we dwell upon the difficulties which asthenopic people experience so often from exposure to the various forms of artificial illumination; difficulties explained by the heat accompanying all ordinary artificial lights, by the flickering of unsteady lights, and by the disagreeably strong contrast between the light from a flame placed so as to fall on an eccentric part of the retina, and that from the less strongly illumined object of regard. It is enough now to say that these conditions are distressing chiefly to patients of naturally neurotic

* The substance of a Clinical Lecture delivered at the Moorfields Hospital, June 22, 1887.

disposition, and especially when to such disposition is added a permanent sensitiveness of the surface of the eye, induced by previous attacks of conjunctival inflammation, phlyctenulæ, or stytes.

Our present object is to inquire whether any forms of retinal or choroidal disease localised in the central region can be attributed to too prolonged use, or too intense illumination? And here we must remember that this region is the most perfect in function, and therefore the most vascular and most highly organised region of the perceptive apparatus of the eye; the capillary network both of the choroid and retina is closer here than in any other part of the eye, and the intrinsic capillaries of the optic disc are probably nearer to the direct blood-stream of the ophthalmic artery, and therefore more easily distended than those further back in the optic nerve.*

The well-known predisposition of the optic disc and yellow-spot region to inflammatory and degenerative disease, due to various local and constitutional causes, naturally prepares us to admit the possibility at least of such occurrences as have been referred to. The disc is the most inflamed part in optic neuritis from intra-cranial disease; it is the part first affected in tobacco neuritis, and probably in the changes known as progressive atrophy; it is often decidedly inflamed if a patch of choroiditis occur in its neighbourhood; it becomes congested in some cases of iritis; and in cases of traumatic inflammation of the front of the eyeball, inflammation first of the disc and then of the trunk of the optic nerve is a very common occurrence; the hazy and striated state of the disc in hypermetropic eyes, sometimes quite indistinguishable in appearance from true papillitis, is well known, and is perhaps attributable, like the inflammation in the traumatic cases last mentioned, to similarity of the vaso-

* Nettleship, *Ophthalmic Hospital Reports*, vi. p. 57.

motor nerve supply to the front and back of the eye-ball. It has even been suggested (Gowers) that hypermetropic eyes are, *ceteris paribus*, more likely to suffer from optic papillitis, whether due to brain disease, or to constitutional causes, than others. In myopic eyes also there are frequently appearances at the disc, to which we cannot consistently deny the term papillitis.

The yellow-spot region is, we know, especially liable to very large hæmorrhages, and is the seat of election of the principal changes in embolic and albuminuric retinitis; the several forms of chronic senile choroidal disease are also nearly always confined to the posterior pole of the eye.

Still, in none of the above instances can it be said that the morbid proclivities, or the actual alterations, are caused directly by too intense or too prolonged stimulation of the percipient or the conducting elements of the retina. In the case of the other special senses, as in that of the retina, overuse produces temporary exhaustion of sensibility; but I do not know of any structural diseases of the auditory apparatus from exposure to loud sounds, or of the gustatory or olfactory nerves from corresponding causes. In all the ordinary instances of disease from over-activity, either friction, pressure, heat or motion, seems to be the actual cause; witness the thickening or blistering of the skin from rowing, etc., many chronic inflammations of joints and bursæ, and various chronic local skin diseases. I am inclined to think that the only retinal affections which can at present be positively set down to the effect of over-use are the temporary, though prolonged, exhaustion (*torpor retinæ*) which occurs in endemic night-blindness, —and forms also a part of what is called snow, ice, and electric-light blindness, and which, after all, is not accompanied by any visible ophthalmoscopic changes —and the inflammatory changes which have in a few cases occurred on exposure to the intense light and heat

of direct sun-rays, and which have been produced experimentally by the same means.*

Some few cases do, however, occur of disease localised at the yellow-spot region in which, without exposure to direct sun-rays, there is at least reason to inquire whether over-use, either in duration or intensity, may not have taken a principal share in the result; and, without drawing any conclusion, I think it well to relate such of these as I have seen. The much commoner occurrence of similar cases apparently in no connexion with too much functional activity of the retina, does not weaken the suggestion that intense light or prolonged use are occasionally important factors in, if not the chief exciting cause of, a retino-choroiditis.

CASE I.

Choroido-retinal disease at yellow-spot of one eye coming on during the use of a telescope in Survey work.

Captain D., 33 (P. 14, 120), is employed largely on Naval Survey work. No history of syphilitic symptoms. Early in 1885, when surveying off the west coast of Australia, he observed that the cross wires of the telescope of his theodolite looked as if "broken." The defect was in the right eye, the one which he always used for such work, and it came on one day at the end of three hours' continuous use of the theodolite. He said, on inquiry, that there was no very great heat or glare.

The defect was permanent. When I saw him two years later (April, 1887) vision with the affected eye was barely $\frac{6}{9}$, and horizontal parallel lines appeared to bulge out at the centre so as to assume a doubly convex curve; refraction E. At the Y. S. were a number of very fine

* Cases of disease at the yellow-spot caused by gazing at the sun are recorded by Swanzy and Snell in O. R. ii., 141 and 142.—Deutschmann's cases and experiments are referred to at p. 110 of the same vol.—An excellent abstract, by Mr. Gunn, of all the cases recorded and of Czerny's experiments, is found in the London Medical Record, 1883, p. 405.

pale dots of, apparently, choroidal disease, without pigmentation; the halo round the Y.S. was rather plainer than usual. The other eye was perfect in all respects, and refraction E.

CASE II.

Rapid failure of the working eye, with central choroido-retinal changes, after prolonged use followed by exposure to glare from snow. Other eye defective and squinting.

Mr. L., 40 (P. 5, 138), had for many years depended on his right eye; the left, affected with a high degree of convergent squint since an attack of inflammation at æt. 14, being very astigmatic and moderately defective. At the age of 40 the right failed rapidly, became nearly blind, and then improved; an ophthalmic surgeon told him that a small vessel had probably ruptured. The failure occurred in February, 1881, and was first noticed one morning after a ball; he nevertheless went out shooting all day, the country being covered with snow at the time. The sight got worse, and continued to fall lower for several days.

I saw him in the following June. The affected eye had from 5 to 6 D. of H., and V. (corrected) $\frac{1}{30}$; no As.; at the Y.S. were numerous small palish spots, "probably choroidal, but possibly retinal"; O. D. n.

The L. showed no changes; vision now better than R.; with + 7 D. Sph. } $\frac{1}{12}$ partly : a high but varying degree of convergent squint. He always sees double.
+ 2.5 D. Cyl. }

A free liver; has once had gout and inherits it. Gonorrhœa several times, but no proof of syphilis.

CASE III.

Choroido-retinal Disease at yellow-spot of one eye, coming on acutely a few hours after a brief exposure to glare in using microscope.

Dr. — (P. 11, 205), a hospital physician of 50, liable to gout, but in other respects in good health.

noticed a sudden failure of his left eye on going to bed one evening in July, 1885; it was at first like a "spreading light" in the middle of the field, then a "red spot," and finally remained as a "churning white smoke." The "white smoke" gradually diminished, and when I saw him two months afterwards (Sept. 10th), it was noticed only when he was weary; vision was then, however, no better than $\frac{6}{18}$, and objects looked small and somewhat broken; the other eye was normal; at the Y. S. region in L., I found a considerable area of disturbance of the pigment epithelium. He was told by a good observer who examined him very soon after the failure that there was then no change to be seen. Two years later (July, 1887) he reported that the sight had improved very much, but that the eye soon tired, and objects still looked smaller than to the other eye. Dr. G. A. Berry reported vision now with this eye $\frac{20}{20}$ and 1 J.

About one o'clock of the day on the evening of which the defect appeared, the patient had for a few minutes used the left eye at a microscope illuminated by direct sunlight, with a power of about 400 diameters. He was in the habit, naturally, of using the microscope from time to time, and I do not think it had occurred to him that the lesion might possibly be due to the above-mentioned unusually brilliant illumination.

CASE IV.

In a case lately published by Dr. Brailey* the same question comes in. Here central choroido-retinal changes came on rapidly in the patient's only remaining eye after he had been closely engaged at some fine pen and ink drawings which he undertook for a publisher from time to time. It is true that several additional spots of disease, each attended by fresh subjective symptoms, occurred within the next twelve months, whilst he was carefully abstaining from anything like strain of the eye. This gentleman, like the subject of Case II. above, was very hypermetropic, and, like him, had only the one working eye, the left having been lost

* Brailey. Trans. Ophth. Soc. VII., 177.

by glaucoma at the extremely early age of 20. I had the advantage of seeing Dr. Brailey's patient with him on one occasion, and the changes then present were closely similar to those in Cases I. and II.

CASE V.

Acute general choroiditis after exposure to heat, glare and wet in helping to extinguish a fire.

Mr. M. (P. 11, 108), a Naval Lieutenant, æt. 22, who had never incurred risk of venereal infection, after being for some time at Bermuda, where the bright light reflected from the very white roads caused intense glare, left for England on April 18th, 1885. Within a few days he was laid up, on board ship, with an attack of colic, attributed to some arsenical green pigment powder that was upset and inhaled by him. On 23rd, whilst he was laid up, a fire broke out on board, and, though "doubled up with colic," he was upon deck all night in charge of his company, exposed to much heat and glare, and at the same time drenched with water. For the next three days he was much exhausted, and kept his cabin, but on coming on deck again on 27th he found his sight very defective in both eyes. The right seems to have been the worse at first, but soon it improved, and the left became the worse.

I saw him in June, and found vision of R. $\frac{6}{18}$ and 1 J. held close, L. letters of 19 J. only. In both there was extensive choroidal disease in large, irregular, confluent areas of superficial change about the central region, and in separate patches towards the periphery. In L., where the changes were more abundant, the O. D. was somewhat swollen and hazy, and the veins tortuous; the R. O. D. was normal. He took iodide and mercury for two months without either benefit or injury to his sight.

There were no signs of hereditary syphilis, but I was not able to investigate the family history fully. A brother had lost one eye from some form of inflammation.

CASE VI.

Iritis and choroiditis disseminata in a youth of very fair complexion. Probable influence of exposure to hot sun. Syphilis not quite excluded.

L. H., 16, a rather delicate-looking lad, thin, with flaxen hair and light irides, teeth having very bad enamel, but not being of syphilitic formation, showing no evidence of acquired syphilis, but admitting risk on two or three occasions within the last few weeks, came in September, 1882 (P. 7, 54), with mild subacute iritis, areas of confluent spots of choroiditis at the periphery, and opacities in the vitreous. Both eyes were affected, but the L. was rather the worse, vision of R. being $\frac{20}{20}$ and of L. only $\frac{20}{40}$. No evidence of syphilis in family history.

The eyes had been more or less misty and inflamed for about three months, and he attributed the attack to the effect of working in the sun. He had left school, and been apprenticed to a carpenter very shortly before the attack began, and one of the first tasks he was put to was some heavy out-of-door work, chiefly sawing, for several days when the sun was extremely powerful. Under treatment (rest, dark glasses, atropine, iodide and mercury) his eyes rapidly improved, and I believe that I should have seen him had any relapses occurred.

CASE VII.

Choroiditis disseminata coming on in the summer in a delicate lad, growing fast. Old squint. Disease most abundant in the working eye. Influence of microscopical work.

Mr. D., 16 (P. 6, 2), was sent to me by Mr. Priestley Smith in October, 1881.

The left was operated on for divergent squint when he was ten, and he told me he did not use it; certainly in using the microscope, of which he was fond, he always used the right. He had been subject to bronchitis formerly; for

about a year before we saw him he had not grown at all, until the summer holidays, when he grew an inch between July and October, 1881.

Towards the end of these holidays, in September, when in Devonshire, the R. (the working eye) failed, with some pain and a little redness, the sight never getting very bad. No perceptible defect occurred in the L. When seen in October there was disseminated choroiditis in both eyes, with haze of retina and slight papillitis; the patches were partly atrophic, partly in the stage of exudation. The disease was much more abundant in the R., and affected the Y. S.; in the L. there were only a few spots, and none were central. Vision of R. $\frac{1}{50}$, L. $\frac{1}{12}$; refraction E.

He was a florid boy, with dark hair, and showed no signs of syphilis. He was interested in natural history, and had been using a microscope during the holidays, and, as already stated, with the right eye. There was, however, no history of decided over-use of the eye, nor of exposure to particularly strong light.

ERIK NORDENSON (Stockholm). Detachment of the Retina: An investigation of its pathological anatomy and pathogenesis. With an introduction by Dr. Th. Leber. Wiesbaden, J. F. Bergmann, 1887.

Nordenson's work is one of exceptional importance, for it deals with a subject of which our knowledge is incomplete, and it definitely advances it. In size, in style, and especially in the extreme beauty of its illustrations, it reminds us of Prof. Becker's book on the "Anatomy of the Healthy and Morbid Lens," published in 1883. As in the case of the last-named work, we shall attempt to give some idea of the contents of each chapter in succession.

Leber's introduction states the scope and main outcome of the work. It presents the continuation and completion of his own study of the matter, which was briefly described at the Heidelberg Congress in 1882. The material employed by Nordenson in his anatomical investigation included three

freshly enucleated specimens of spontaneous retinal detachment, one of which had been entirely free from clinical evidence of inflammation. The records of the Göttingen Eye Clinic and of Prof. Leber's private practice were placed at the disposal of the author.

The main result is a confirmation of Leber's theory : detachment of the retina in general, apart from certain rare forms, is caused, not by a primary exudation from the choroid, but by traction of the shrinking vitreous. The observations demonstrate not only the shrinking of the vitreous, but the effect of this upon the surrounding structures, including rupture of the retina ; and they show how it is that the process does not reveal itself to the ophthalmoscope alone. The vitreous undergoes a process of chronic thickening without loss of transparency ; wavy fibrils are developed in its substance, and its volume decreases ; the space thus produced is filled posteriorly with serous fluid, but the anterior portion of the retina, which is specially adherent to the shrinking vitreous, is drawn inwards by it. The change in the vitreous is allied to senile sclerosis in other tissues, combined in many cases with cell proliferation ; it is due to a chronic inflammation of the uveal tract.

Chapter I. deals with the history of retinal detachment prior to the introduction of the ophthalmoscope. Mention is made of the disorder as early as 1722 by the French oculist Saint-Yves, and a little later the anatomists Morgagni, Haller, and Zinn observed it when dissecting the eyes of animals and man. The English oculist, James Ware, in 1805, discovered a retinal detachment, *post mortem*, in a blind eye which had been under observation during life,—the first case combining anatomical observation with a clinical history. Wardrop, in 1818, published the first drawing of the condition, which he regarded as a dropsy of the choroid coat. Other drawings, in colour, followed, by Panizza, Von Ammon and Dalrymple. The credit of laying down the symptoms of advanced detachment belongs to Julius Sichel, who, ten years before the ophthalmoscope was discovered, described completely the non-ophthalmoscopic appearances in the living eye. During this same period the

best anatomical description was given by Arlt. The prevailing view at this time was that a primary exudation, either from the choroid or from the retina, was the cause of the detachment.

Chapter II. describes the pathological anatomy and pathogenesis of the disorder as investigated after the introduction of the ophthalmoscope in 1851. Coccius and Van Trigt, simultaneously, in 1853, described the ophthalmoscopic appearances of a retinal detachment; a year later Von Jaeger published a drawing of the same, and in 1854 a short but important paper by Von Graefe appeared in the first volume of his Archives.

The hypotheses offered in explanation of the disorder were very various. By Graefe and by Arlt the primary cause was supposed to be hæmorrhage or a serous exudation from the choroid. Stellwag pointed out, in opposition to this idea, that a healthy vitreous would not permit of the collection of fluid beneath the retina in the manner in question, and that the mobility of the detached portion necessarily implies the presence of a layer of fluid on each side of it. To him belongs the credit of drawing special attention to previous changes in the vitreous as a predisposing cause.

Heinrich Müller developed the theory that detachment of the retina is produced by shrinking of the vitreous body. He showed that such shrinking is caused by the production in the substance of the vitreous of bands and fibres originating in exudations and extravasations; also that the shrinking may have two results. It may separate the hyaloid, together with the retina, from the choroid, or in more favourable cases it may separate the hyaloid from the retina, producing only a detachment of the vitreous instead of a detachment of the retina. This detachment of the vitreous was demonstrated anatomically by Iwanoff, who many times in the eyes of old people found the vitreous, shrunken but not liquified, separated in the posterior half of the eye from the retina, and leaving an interspace which was filled with fluid. Iwanoff pointed to such detachment of the vitreous as a precursor and companion of retinal detachment. He found it in three myopic much elongated eyes which had

sustained no injury, and in these cases attributed it to the distension of the outer tunics.

Perforation of the detached retina, at first supposed to be attributable to hæmorrhage, or to the excessive pressure of the sub-retinal fluid, was referred to by Von Graefe in his first article on the subject, but the first accurate description of a spontaneously occurring perforation appears to have been given by Liebreich. Von Graefe's idea that the retina is ruptured by pressure of the fluid external to it was refuted by E. Hansen, who pointed out that the mobility commonly to be seen in the detached portion excludes the idea of an inequality of pressure on the two sides of the membrane. De Wecker advanced the question still further by pointing out that, in the absence of a perforation, the quite sudden occurrence of a large detachment such as is often met with is inexplicable, for it would imply a sudden disappearance of a corresponding portion of the vitreous; he urged that the rupture occurs first, and leads directly to the sudden detachment of a portion of the retina, some of the fluid previously collected between the retina and the detached vitreous passing through the aperture of the retina, thereby raising that membrane from the choroid, and causing it to hang freely between two communicating layers of fluid.

Much attention has also been directed to the occurrence of pressure-changes within the eye in connection with detachment of the retina. Schnabel alleged that the intra-ocular pressure is sub-normal in every case of fresh detachment, and that the reduced pressure upon its inner surface is the essential cause of the separation of the retina from the choroid, and leads secondarily to an effusion of serous fluid between these two membranes. In support of this theory, the "aspiration theory" as Nordenson terms it, Schnabel points to the fact that the anterior chamber is often much deepened in these cases, and this he regards as proof that the vitreous pressure is diminished. This explanation fails, however, for according to many trustworthy observers the tension of the eye, though sometimes reduced, is quite normal in many cases of fresh detachment.

Further light was thrown upon the matter by Leber in 1882. In eyes under frequent accurate observation he had seen, beyond question, the sudden occurrence of detachment associated with sudden loss of sight in a previously active portion of the retina, and he explained this, as De Wecker had done, by supposing that the sudden occurrence of a rupture in the retina permits the outward passage of fluid previously accumulated on its inner surface. In 14 out of 27 cases he had been able actually to see an aperture in the retina. In the course of his experiments concerning the behaviour of aseptic fragments of metal introduced into the vitreous of rabbits, he had observed rupture and detachment of the retina as consequences of the shrinking of the vitreous. He had also seen the same results after injections into the vitreous of sterilised salt solution. In the eye of a patient previously under his care for high myopia, with detachment, he had been able to demonstrate the structural changes in question. The vitreous body was detached throughout the posterior half of the globe, it presented a finely fibrous consistency, and in shrinking had dragged the retina from its normal position. In evidence of the traction from within which ruptures the retina, he had found the margins of the aperture drawn inwards in all cases, never outwards.

The three cardinal points in Leber's position are, then, the following:—Spontaneous detachment of the retina occurs suddenly. It occurs without noticeable changes of the intra-ocular pressure. It is caused by shrinking of the fibrous vitreous, which tears the retina, and in this way leads to its detachment.

Walter, in 1884, analysed 300 cases of retinal detachment observed by Horner, with special regard to their etiology. He showed the connection with progressive myopia, and also a connection with congestive and hæmorrhagic conditions of the retina and choroid; in some cases, on the other hand, no such etiological conditions could be made out. He concluded that a sub-retinal hæmorrhage is the starting-point in a considerable number of cases.

Nordenson, while admitting a distinct connection between hæmorrhagic accidents and detachment of the retina, denies, on grounds already given, that the detachment is directly

due to a sub-retinal effusion ; he substitutes a more satisfactory explanation. Detachment, when connected with hæmorrhage, is mostly met with in young people suffering from anæmia and chlorosis, in women affected with suppressed menstruation and in allied disorders, and in elderly people with general arterial sclerosis and apoplectic tendencies. These constitutional conditions are all apt to cause hæmorrhage into the vitreous body. Such extravasations may be absorbed and leave no mischief behind, but the result is sometimes less favourable ; the constitution of the vitreous may be altered in such a way as to lead to shrinking, with the resulting traction on the retina, rupture, and detachment above described. This explanation applies to a well-marked though not large group of cases in which the detachment is manifestly associated with intra-ocular hæmorrhage.

Statistics show that detachment of the retina increases in frequency with the advance of life, and that this depends upon increasing degeneration in the vascular system is highly probable. Degeneration of the vessels of the uveal tract impairs the nutrient supply to the vitreous, and impaired nutrition alters the consistency of the vitreous, and may lead to shrinking and the whole train of evil consequences already described.

P. S.

(*To be continued.*)

TH. TREITEL (Königsberg). — Adaptation of the Normal Eye. *Von Graefe's Archiv.* XXXIII. 2, p. 73.

If night-blindness be a lesion of the power of adaptation, as Treitel has described it (*vide* O. R., vol. V., p. 172), the investigation of normal adaptation becomes a matter of practical importance to the oculist. Of former observers Treitel mentions Aubert, who found that the sensibility of the retina was multiplied by 35 within some two hours after first entering a darkened room ; Landolt, who found that the eye during adaptation recognised colours in the following order : green, yellow, red, and, lastly, blue and violet ; and

Peschl, who found the order somewhat different, viz.: violet, green, white, yellow, red. In this connection it should be noted that the non-adapted eye exhibits the same disturbance in its peripheral colour-vision that Wolffberg found in the eyes of the night-blind, viz., that pieces of Marx's red cloth are perceived further from the centre of the field than similar blue pieces, the normal eye showing the opposite condition.

Treitel observes that the amount of adaptation depends upon the difference between the illuminations in the two rooms (the light and the darkened room); the greater this difference, the greater the adaptation obtainable. Also the adaptation, other conditions being the same, increases with the size of the visual angle. In testing, it must be recollected that the non-adapted eye sees better indirectly than directly.

A much greater influence seems to be exercised by adaptation upon the light sense than upon the form sense. Treitel found vision multiplied by three, while light was multiplied by 20, and on another occasion vision multiplied by 10, while light was multiplied by 120.

Central colour-vision in the non-adapted eye is so low that it is difficult to test it quantitatively. Qualitatively, central colour-vision was found by Treitel to follow Landolt's order: green, yellow, red, blue. It is known from Aubert's observations that the fully adapted eye can perceive red correctly with relatively lowest illumination, and this is corroborated by Treitel. He gives no explanation of the curious fact that in testing with Marx's cloth he found that the non-adapted eye perceived colours in a different order to that in which it saw them when using "Heidelberg colours." Treitel found a similar difference in the behaviour of the eye towards these colours in testing peripheral colour-vision. The adapted eye possessed contracted colour fields, but the red field extended further from the centre than the green field, reaching nearly as far as the blue field. In the non-adapted eye the green field was the largest, the blue next, and the red the smallest. These are the fields for Heidelberg colours. Marx's cloth gave corresponding fields in the adapted eye, but in the non-adapted eye the red field extended much further than that for either green or blue,

which were of nearly equal size. Treitel finds the periphery of the normal field contracted in diminished light when tested, not with white objects, but with grey, these grey tests being visible at the extreme periphery in ordinary daylight, so that the fully adapted eye has a contracted field both for colour and for white.

Adaptation is considerably increased by exposing the eye previously to very bright light, the time, of course, being naturally materially lengthened. A non-adapted eye is also found to become fatigued much more rapidly than an adapted eye under similar conditions, and Treitel regards adaptation as a restoration (*Erholung*) of the eye; the return from a condition of fatigue to one of power restored by rest. The different behaviour of central and peripheral vision in the non-adapted eye favours this supposition, the relatively rapid invasion of fatigue in the macula lutea being a well-known physiological fact.

If adaptation consist merely in the disappearance of a state of fatigue, it would be natural to regard the peculiar lesions of colour-vision in the non-adapted eye as the effects of the character of the light that caused the fatigue—viz., daylight. Treitel found accordingly that the lesions of colour-vision in the non-adapted eye were completely altered by the quality of the light previously employed to fatigue the retina, and concludes that the colour-vision of the non-adapted eye is influenced principally by the quality of ordinary daylight, which is known to contain a preponderance of red rays.

The facts all tend to show that adaptation is a property of the retina, as do also clinical observations of symptomatic night-blindness—it being a symptom of intra-ocular disease exclusively.

In favour of Treitel's theory that night-blindness is simply defective adaptation may be urged the fact that the qualitative colour-lesions found by Förster and by Wolffberg for the direct and indirect vision of the night-blind fully coincide with those found in the non-adapted eye.

Secondly, from the preceding experiments it is seen that the defects in the visual field of the night-blind can be explained by anomalies of adaptation.

Thirdly, the extension of night-blindness in the field, from its centre to the periphery, and the marked dulness of the macula are quite in accordance with the behaviour of the non-adapted eye.

J. B. S.

SCHWEIGGER (Berlin). The Return to the Flap Operation. *Archiv. für Augenheilk.* XVIII. 2, p. 143.

The author—who seems to have no doubt that ere long all operators will have abandoned the “peripheral linear” incision, and the numerous modifications of it, in extraction of senile cataract, for one more closely resembling that of the old flap operation—speaks of this change as one of the most interesting which eye surgery of the present day is likely to undergo. Every surgeon will cordially agree with Schweigger in his remark that the restoration of sight, with retention of a circular movable pupil, is one of the most beautiful of operative procedures. How came it, he asks, that we ceased to strive after this ideal result? For an answer to this question, we must glance at the conditions which obtained regarding ophthalmic surgery about thirty years ago.

At that time the whole ophthalmic world was excited over Von Graefe's recent discovery of the value of iridectomy in glaucoma. The magic word “antiphlogistic,” was applied by some one to iridectomy, and very rapidly it came about that removal of a portion of the iris was used not only as a cure for existing, but also as a preventive for anticipated inflammation. Moreover, Von Graefe, who had shown that there were advantages in the combination of iridectomy with the flap operation for extraction of cataract, was gradually led to adopt this troublesome proceeding, as Schweigger styles it, in all operations for cataract, in discussion equally with his rightly valued so-called “linear extraction.” Under the powerful influence of his example iridectomy came to be recognised almost universally as indispensable in cataract operations.

* *Arch. für Ophthalm.*, II. 2, p. 247.

The method (linear extraction), so fully described by Von Graefe in 1855, is preferable for all cataracts which do not contain a hard nucleus. In very young children discission only is to be recommended, and, indeed, may be employed up to the twentieth year ; but as soon as the patient is old enough to behave intelligently during the after-treatment, extraction offers greater advantages. Although most desirable, complete opacity and softening of the lens is not essential. Von Graefe operated as follows :—An incision 5 mm. long was made with a keratome on the temporal side of the cornea, 2 mm. from its margin, the anterior lens capsule opened with a cystitome, and the lens matter evacuated by gentle pressure exerted by means of a curette close to the temporal lip of the wound, and counter-pressure at the opposite edge of the cornea. Schweigger prefers a longer incision (7-8 mm.) made in the upper part of the cornea.

When we reflect that the flap operation was the only method then in use for the extraction of fully opaque lenses, we can readily appreciate the value of Von Graefe's procedure, and it is consequently quite conceivable that he tried to extend his method to the extraction of nuclear cataract. The name (linear extraction) which he had chosen for his method was unfortunate, and the success which was attained by it, in cases for which the flap operation was really unsuitable, was ascribed to the linear incision. In a true linear section, the inner and outer incisions must, of course, lie in one and the same radius of the cornea, and the thickness of the lips of the wound be equal to that of the cornea. Such an incision cannot be made with a keratome ; if the narrow Graefe knife be used, it must be held throughout the section so that an imaginary prolongation of its surface would pass through the centre of curvature of that part of the cornea. In Schweigger's experience such an incision is not worthy of recommendation ; he considers that it possesses all the disadvantages which are attributed to the flap operation : the wound readily gapes, and prolapse of iris and vitreous are frequent occurrences, especially if there be some hard fragments of lens matter to be removed.

Von Graefe soon came to the conclusion that the linear

incision was not suitable for the extraction of senile cataract, for which he adopted a curved incision close to the sclero-corneal junction, and thus obtained a greater length between the angles of the wound, with a short flap. He published (*Arch. für Ophthal.* *XIV.* 3, p. 114) some illustrations of cases operated on by this modified linear method, which are reproduced in Schweigger's paper.

Among the objections to this method of operating, the not infrequent formation of cystoid cicatrix was noted by Hasner and Welz; iridectomy was essential to make room for the exit of lens, and for bulky cataracts the section proved to be too small. Thus, surgeons gradually came to make a flap 3-4 mm. in height, the incision being in or very near to the limbus corneæ; a proceeding closely resembling the old flap operation, but not called by its name.

Having now returned to the flap operation, the question arises whether the Graefe knife is the most appropriate instrument to use; a large flap can be made by it only if a sawing movement be employed. G. A. Richter, a century ago, gave it as his opinion that the best knife was one which would almost complete the section in its onward movement, leaving but a small bridge of tissue to be divided by the return stroke. The incision with such a knife need be no larger than that made with a narrow blade; indeed, its size can be regulated with nicety; and the advantage of a regular section adds greatly to the chances of a smooth cicatrix, with little disturbance of the corneal curvature. The manipulation is rather more difficult than that of the Graefe knife; the puncture having been made at the inner border of the limbus of the cornea, the blade must be pushed onward, exactly in the plane of the limbus. This is not so simple as might be thought, for, in consequence of the refraction by the aqueous, the point of the knife will appear to be higher than it really is, and the counter-puncture may be too deep, thus making the section oblique.

Schweigger states that for a year past he has entirely relinquished the narrow knife. He at first used one with a triangular blade which, 30 mm. behind the point, was 5 mm. in width, but was soon led to adopt one measuring 7 mm.; the corneal flap was 4 mm. in height, and in the later cases

no iris was removed. In order to compare the results with those of the old flap operation, he took ten cases in which one eye had been successfully operated upon, and on the second eye did the flap operation downwards, making a flap, which included half the cornea, with a large Beer's knife. Eight of these ten patients obtained an acuteness of vision of $\frac{1}{2}$ to $\frac{1}{6}$; two were improved by a secondary operation; and in one there was entanglement of iris in the whole length of the wound. He then returned to his former method, and made the incision upwards.

The re-adoption of extraction *without* iridectomy will come but slowly, and a question concerning which all will be exercised is whether the black spot on the horizon of this classical operation be as black as it has been painted. The precautions which must be observed in order to avoid prolapse of iris can only be learned by experience; the incision if too long or too peripheral favours prolapse; if the flap be less than 4 to 4.5 mm. in height, iridectomy must be performed.

If, with the exit of the lens, the iris be pushed out, it can easily be returned by the gentle use of a spatula; when it accompanies protrusion of the vitreous, however, it should be cut off. In sixty-two cases operated upon by Schweigger, there was prolapse of vitreous in only two.

The after-treatment practised and recommended by the author consists in the use of eserine drops immediately the operation is concluded, and again at the first dressing; bandaging both eyes for the first three days; the avoidance of all sudden or forcible movement by the patient, without, however, insisting upon absolute rest on the back; the use of atropine after the third day. He also emphasizes the desirability of not examining the wound for some days, unless special indications for this arise.

If prolapse of iris have occurred, it should be removed only if it occupy the greater part of the wound, and in such a case, not for two weeks after the extraction. If the entanglement be small, Schweigger counsels a masterly inactivity, and cites a case in which, with a small prolapse, vision was $\frac{1}{2}$ three weeks after extraction, and $\frac{1}{4}$ in two months' time. He believes that the ill-effects of prolapse

of iris consists mainly in the asymmetry of the cornea produced by the irregularity of the scar.

The concluding remarks of the author appear to us to detract somewhat from his strong recommendation of this method of operating, inasmuch as he states that the acuteness of vision obtained is no better than that resulting from extraction *with* iridectomy, especially if only a small piece of iris be removed, and at the upper part, so that the coloboma is almost completely covered by the upper lid. The reduction in visual acuity which iridectomy produces is due less to the enlargement of the pupil, than to the irregular curvature of the cornea, which results from the incision in it, a result also seen after sclerotomy.

Nevertheless, his opinion is that, thanks to the discovery of cocaine, the flap operation *without* iridectomy will again come into general use; without this drug he would have continued to operate with the aid of general anæsthesia, and have performed a flap operation upwards *with* iridectomy.

J. B. L.

SCHMIDT-RIMPLER (Marburg).—A Case of Glioma of the Pons.—*Archiv. für Augenheilk. Band XVIII. Zweites Heft, pp. 152-170*

Prof. Schmidt-Rimpler publishes this case as a contribution to the subject of nuclear paralyses and the question as to the causation of choked disc. The patient, a young woman, aged 20 years, who had previously been in good health, was admitted into the Eye Clinic on 14th November, 1885. Six weeks before she had been seized with headache and giddiness. A few days later she had diplopia, which lasted three weeks, then disappeared. Meanwhile she developed a convergent strabismus of the right eye. The headache diminished, but there was much giddiness, increased by lying in bed. She was to all appearance healthy, and showed no evidence of syphilis. There was partial paralysis of the right abducens, but otherwise no abnormal ocular symptoms. The left naso-labial fold was less marked than the right, but the oral movements were good. There was no affection of the tongue or palate, and speech, though

slightly indistinct, was said not to have altered. Knee jerks exaggerated, ancle clonus scarcely recognisable. A few days later the right abducens paralysis had diminished, while the left abducens had become affected, and on December 2nd was completely paralysed. Headache and giddiness varied much, gait and speech also varied, and she had tinnitus aurium. Ordinary motor power and sensation were unaffected, and the vision and fundi were normal.

In January the patient got much worse, the gait became reeling, the speech and swallowing very defective; there was difficulty in moving the tongue, and regurgitation of liquid food through the nose readily occurred. Sensation and ordinary motor power were unaffected, but the reflexes were much exaggerated. Gradually, in the end of January, paralysis of the extremities and of the trunk muscles set in, and swallowing became impossible. Three days before death she had an attack of vomiting, respiration became shallow, and at one time artificial respiration was used. Up to this time there had been no change in the fundi, but now there was noticed a slight clouding of both discs, especially of the lower margin, and in the right eye it was noted that one of the large inferior veins pulsated even beyond the disc, which had not previously been the case. Except for the paralysis of the external recti, all ocular movements were normal. She died on January 31st.

At the necropsy, Professor Marchand found a tumour involving the anterior and inferior part of the pons, inclosing both sixth nerves, which were markedly atrophic. The third nerves lay anterior to the tumour, and the fourth turned round it unaffected. The fifth, the facial and the auditory nerves were compressed, but white. The medulla and the neighbouring portions of the cerebellum were much distorted. Section and microscopic examinations showed the tumour to be a glioma, commencing probably in the anterior part of the pons, in or near the pyramidal tracts, and spreading back along these. The upper and posterior parts of the pons and medulla oblongata were not involved in the tumour.

The outstanding feature of the clinical history was the great variation in the symptoms, although this is not so

manifest in our meagre abstract as in the detailed original account. Bilateral affection of an ocular nerve, *e.g.*, the sixth or third, raises the notion of nuclear disease, and this is strengthened if the paralysis vary within short periods. The history of the case, therefore, pointed to a nuclear paralysis of the sixth nerves, the disease extending backward to involve the hypoglossal, facial, and vago-accessorius, and, finally, to involve the crossed pyramidal tracts, causing spastic paralysis of the whole body. The necropsy showed, that the abducens nerves were paralysed from being involved in the tumour, and that the tumour growth really began in the pyramidal tracts, and caused the apparently nuclear symptoms by pressure, the nuclei being free of the growth.

Schmidt-Rimpler comments on the late appearance of intra-ocular change, and the slight but definite changes which led him to diagnose commencing optic neuritis. This was confirmed *post mortem*. Longitudinal and transverse sections of the optic nerve and the papilla showed, especially in the transverse sections, broad spaces among the nerve bundles and connective tissue framework, either empty or occupied by translucent masses. These spaces were less marked in the peripheral, *i.e.*, the subvaginal part of the optic nerve, but at points the pial sheath was separated from the underlying nerve. The changes could be traced backward to the entrance of the retinal vessels into the nerve, were less marked in the portion between the entrance of the vessels (the artery entering nearer the brain, the vein nearer the eye), and disappeared in the part of the nerve towards the foramen opticum. In the affected area the sheath, as well as the nerve, showed changes, a space wider than usual separating the dural and arachnoid sheaths together, from the pial sheath. There was no increase of white cells visible either in or around the nerve. The lamina cribrosa, in place of being curved, ran straight across, and the papilla itself showed a spongy texture distinctly abnormal. Many of the nerve fibres, both without and within the lamina, showed ganglionic enlargements, to which probably, Schmidt-Rimpler believes, was due the slight loss of translucency. He considers that these appearances indicate œdema with no inflammatory exudation, and

justify his theory that the optic neuritis of intracranial disease is due to a rise of intracranial pressure forcing the subdural or subarachnoid fluid along the nerve into the subvaginal space, and thus producing an œdema of the lamina cribrosa, with consequent venous stasis, and, later, arterial obstruction.

This, it will be seen, is the true "choked disc" theory, which has of late years fallen into disrepute, in this country at least. Schmidt-Rimpler criticises the theory of Leber as elaborated by Deutschmann (OPHTHALMIC REVIEW, April, 1887), which attributes the inflammation to phlogogenic organisms which have passed with the cerebro-spinal fluid from the cavum cranii to the spaces of the optic sheath. He states that Deutschmann's theory is bound to give an explanation of the fact that all the other cranial nerves are not similarly affected with the optic, not recognising apparently that his own theory has a similar responsibility. He mentions also the variability of the communication between the cranial and the subvaginal spaces as an explanation of the failure of Deutschmann's Agar-agar injections into the subdural space to produce optic neuritis, and points out also that the variation in the fluid pressure inside the optic sheath during disease will induce a slow soaking of the fluid into the lymph spaces of the lamina cribrosa. The fact that hydrops intervaginalis is not always present in optic neuritis does not, he considers, disprove his theory, as the fluid may readily be absorbed after death. He rejects the theory of Parinaud, which makes the œdema of the nerve extend from the brain tissue itself : first, because the cerebral œdema is frequently not present ; and, second, because the proximal part of the nerve is less affected than the peripheral.

Taken altogether, we cannot say that Schmidt-Rimpler has been able to resuscitate his theory as a complete explanation of optic neuritis. That the distension of the optic sheath plays a part in the inflammations is most probable *à priori*, and derives support from the results of tapping the sheath, as in the case recently recorded by Mr. Brudenell Carter. That it is the whole explanation is improbable, not only from the experimental fact

recorded by Deutschmann, but also from the numerous cases recorded by Gowers, and by Edmunds and Lawford, where a descending neuritis was manifestly present.

J. A.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

THURSDAY, JANUARY 26TH, 1888.

PRIESTLEY SMITH, M.R.C.S., Vice-President, in the Chair.

Reported by JOHN ABERCROMBIE, M.D.

A Case of Subretinal Effusion in Chronic Nephritis in a Child.—Dr. James Anderson read notes of this case. The patient was a girl, aged 9 years, admitted into the London Hospital on March 4th, 1887, under the care of Dr. Samuel Fenwick, who kindly allowed the publication of the case. The child complained of sickness and headache, was extremely pale and wasted, but showed no œdema of face or limbs. She passed 50 to 65 ounces of urine in 24 hours, 1010 to 1012 specific gravity, with one-fourth of albumen, some free blood discs and casts of various kinds. The heart was hypertrophied and the arterial tension was high. The ophthalmoscope showed double neuro-retinitis. The child had been healthy till 18 months of age, then had an attack of measles, and was never subsequently well. In November 1886, she was noticed to have frequent nocturnal micturition, and five weeks before admission she complained of headache and sickness, and that she could not thread a needle. A fortnight before admission she had a severe fit, was universally convulsed, and then lay unconscious for three days. When she recovered consciousness, she was practically blind, but partly recovered vision. Dr. Anderson saw the child on April 10th, and found severe neuro-retinitis, with numerous hæmorrhages and considerable pale exudation in the papilla and retina, best seen with +4 D. On the nasal side of each fundus there was an extensive detachment of the retina, greyish pink and glistening, the vessels seem climbing over it with +9 D. The surface of the detachments oscillated freely but

slowly when the head was moved. The child was almost quite blind, but mentally clear. The retinal detachments rapidly increased. Drawings of the fundi were exhibited. That of the left eye showed numerous bladder-like bulgings round the lower and nasal periphery. That of the right eye showed four large detachments almost meeting in the middle, leaving only a narrow quadrangular chink at the bottom of which the fundus could be seen. The child rapidly got worse, the face and limbs got very slightly puffy, the urine diminished in quantity and became almost pure blood. Treatment had no effect. She became more drowsy, had vomiting epistaxis, and bleeding from the bowel, and died comatose on April 24th, about three months from the first complaint of visual defect. The necropsy showed advanced fibroid contraction of the kidneys, the left weighing only three-quarters of an ounce, and being much distorted by a deep fibroid scar at its upper part, the right weighing two ounces and a half, not so severely affected, but both showing (microscopically) marked fibrosis with hæmorrhages. The mucous membrane of the pelves of the kidneys, the ureters, and the bladders was infiltrated with blood, and that of the bladder was raised into soft polype-like growths. The retinae were separated from the choroid by a clear straw-coloured fluid. The brain and other organs showed no gross lesions. Dr. Anderson commented on the rarity of detachment of the retina in children from any cause, and also on the rarity of fibroid kidney in children. One similar case in a girl, aged 14 years, had been published in the *Transactions*. The rarity of such cases and the absence of œdema might very readily cause them to be overlooked until uræmic symptoms appeared. An exanthem such as measles or scarlet fever was probably the starting point in the great majority of such cases.

On the Prognosis of Neuro-retinitis in Bright's Disease.—Dr. Miles Miley, after referring to a case which first attracted his attention to the subject of the paper, explained the method of obtaining his statistics. The names of all the cases occurring in the London Hospital Medical Register under the headings of "Acute" and "Chronic Renal

Disease" for the years 1884, 1885, and 1886 were taken, and the notes examined and extracted, in all 447 entries. This number was reduced by 26 for readmissions of patients, and by 46 for acute scarlatinal cases, so that the total number of cases under consideration was 375. In 211 of these, no separate statement regarding the eyes had been made, but there were good grounds for the assumption that the number of eyes examined, and the number of eyes examined and found normal, were both smaller than they should have been. Of the remaining 164 cases, 105 were stated to be normal, 3 were affected with other changes, 5 from the nature of the notes were rejected, and 51 were definitely stated to have had the eyes affected. The mortality was as follows: 1. Total number of renal cases considered, 375; total number of deaths in hospital in 1884-5-6, 144. 2. Number of cases in which the eyes were unaffected, 105; number of deaths in hospital in same period, 28. 3. Number of cases in which the eyes were affected, 51; number of deaths in hospital in same period, 28. The mortality of the affected cases was, therefore, in hospital double that of the unaffected cases. The 51 affected cases were then separately considered. By various means, including inquiries at Somerset House, 45 deaths out of the 51 affected cases had been traced. The 6 cases unaccounted for were all admitted into the London Hospital for the first time in 1886; and, since the Somerset House indices were only available up to the end of the first quarter of the past year, they could not be traced with any certainty after March, 1887. Sex: males, 38; females, 13; Age: under 20, 2; 20 to 30, 13; 30 to 40, 10; 40 to 50, 16; 50 to 60, 6; 60 to 70, 4. *Duration of Life.* As the majority of the 51 cases were already affected with neuro-retinitis when admitted into the hospital, it was possible only to give the length of life after the first note was taken. One case lived nearly eighteen months, and two nearly fourteen months; all the rest died within the twelve-month. It was further stated that, if all the 6 untraced cases were alive at the "present date," not one would have lived eighteen months from the time the eye changes were first noted. The following 9 cases were quoted as of special

interest, because the eye changes occurred while the patients were under observation in the hospital.

Name.	Age.	Sex.	Duration of Life in days after last note of "Fundi Normal."
R. B.	47	M.	51 days.
E. C.	25	M.	195 "
T. D.	62	M.	162 "
G. O.	51	M.	52 "
G. A.	31	M.	150 "
G. C.	40	M.	145 "
J. W. G.	51	M.	Now in hospital ; has lived fifteen monthssince first note of changes.
E. C.	63	F.	304 days.
H. D.	23	F.	60 "

In order to be on the safe side, the enumeration was made from the date when the eyes were last stated to be normal, not from the date when the changes were first recorded. The duration of life, therefore, amongst these nine cases had not averaged more than six months. Regarding the eye changes themselves, the hospital notes were not generally sufficiently full to admit of accurate conclusions being drawn. The first recorded change was in some cases a slight haze, in others a papillary exudation, and in others again one or more hæmorrhages. The only paper that the author could find which had any bearing on the question of prognosis was referred to, namely, that by Dr. C. S. Bull, in the June half-year number of the *American Ophthalmological Society's Transactions*. It was stated that, in the discussion following that paper, a case was quoted by Dr. Webster of a clergyman who, ten or fifteen years previously, had had this condition of the fundi recognised, and who was still living at the time of the meeting of the Society. This case was quoted as showing the importance of comparing private with hospital practice. The following conclusions as regards the experience in the London Hospital were then submitted as being justified by the statistics : 1, That the retinal changes occur late in renal disease ; 2, That their presence appears to affect the prognosis very materially for the worse, the mortality in hospital amongst the affected cases being at least doubled ;

3, That the prognosis is so bad that not one has lived eighteen months after the changes have been noted ; 4, That therefore the ophthalmoscope affords a most valuable index as to the course any given case of Bright's disease is taking (except, perhaps, in pregnancy cases), unless, indeed, it be supposed that the mortality of the cases considered happened to be exceptionally high, independently of the causes at work which produced the coincident neuro-retinitis.

Mr. Simeon Snell (Sheffield) also read a paper on this subject. He held that the subjects of retinitis albuminurica that came before the ophthalmic surgeon were to be regarded as having, generally speaking, a tolerably defined, or a short limit, to their existence. This referred to cases at all ages. He did not think that the retinal changes ever preceded the kidney disease, as some asserted they might do. He referred to Dr. C. S. Bull's observations before the American Ophthalmological Society in 1886. Out of 103 cases 86 had died, 57 in the first and 12 in the second year ; of the 17 living 14 were seen during the last six months ; 1 had been seen seven years previously. Dr. Gruening reported of 100 cases that none had lived over two years. Mr. Snell alluded to the frequency with which the diagnosis of renal disease was made through patients seeking advice respecting sight, and notwithstanding the numbers that thus passed before the ophthalmic surgeon, his knowledge of the cases was for so brief a period that the final results were not easily noted. He could now trace only eight cases to the end. The respective ages were 37, 34, 56, 59, 31, 66, 23, 39 ; and the periods of death after the retinal mischief was diagnosed 6 weeks, $4\frac{1}{2}$ months, $5\frac{1}{2}$ months, 10 months, $2\frac{1}{2}$ months, $5\frac{1}{2}$ months, 8 weeks, 14 months. Reference was made to the better prognosis in the retinitis associated with pregnancy.

Mr. Critchett thought that all ophthalmic surgeons now recognised the gravity of the prognosis in these cases. He recalled three instances occurring in medical men who lived for five, thirteen, and ten months respectively after the discovery was made ; in the first-mentioned patient only one eye was affected.

Mr. McHardy thought a distinction must be made between hospital and private cases. He had only known

one hospital patient live for two years after the condition was discovered. In young persons, in those in whom it was associated with excessive drinking and in association with pregnancy, the prognosis was not so bad.

Dr. W. J. Collins had seen one case of subretinal effusion in acute nephritis preceded by blindness and severe neuro-retinitis. He remarked that Dr. Miley's paper necessarily only dealt with those who were ill enough to come into a hospital, and concluded by discussing the proximate cause, with especial reference to the hypertrophy of the left ventricle, and the hydræmic condition of the blood.

Dr. Van Millingen had seen one case eight years previously where only one eye was affected ; the patient was still living.

Dr. James Anderson had not meant his case of retinal detachment as a contribution to the subject of Dr. Miley and Mr. Snell's papers, although incidentally it illustrated the subject. Since his student days his attention had been directed to the subject under discussion, and he had early begun to form the opinion that neuro-retinitis appearing in the course of renal disease was a symptom of extremely fatal import. During his term of office as Medical Registrar at the London Hospital, he had read the notes of something like 150 cases of renal disease yearly, and had seen and examined many of the cases included in Dr. Miley's paper. This experience had confirmed his opinion, and for some years he had ventured to teach that the occurrence of neuro-retinitis in renal disease probably meant death within twelve months, and almost certainly that life would not be prolonged for two years. He admitted, of course, that there were exceptions, but they were very few, and, if properly sifted, they would probably be still fewer. The majority of the cases were chronic interstitial nephritis ; but, whether interstitial or parenchymatous, the symptom implied an advanced stage of the renal disease, or, rather, of the tissue changes associated with the renal disease ; and he was not sure that it then made much difference as to prognosis whether the patient were a hospital or a private patient. Dr. Miley had recognised, however, that his statistics dealt with hospital patients, and also that he did not distinguish between the various forms of renal neuro-retinitis, the prognostic meaning of which pro-

bably varies considerably. The monocular cases referred to by Mr. McHardy and Dr. Van Millingen must manifestly be placed in a separate category. A neuro-retinitis from cerebral tumour or other intracranial causes may present appearances indistinguishable from renal neuro-retinitis, and in all monocular cases the urinary and cardio-vascular symptoms of granular kidney would be essential to the diagnosis. Dr. Miley had, to his knowledge, taken a vast amount of pains in his inquiry, and had used every precaution to avoid mistaking the identity of any of his cases. His paper, he might venture to say, was a piece of most conscientious work, going far along with Dr. Bull's statistics to settle the point under discussion.

Toxic Amblyopia.—Dr. Van Millingen read a paper on this subject. During fifteen years' experience in Turkey and the Levant he had not met with a single instance of alcoholic or tobacco amblyopia in a Turk, male or female. As regarded the tobacco, this could not be attributed to the kind smoked, for Turkish men and women used such a large quantity that the amount of nicotine would correspond with the amount in the smaller quantity of stronger tobacco used in this country. He therefore attributed the exemption to the mode of smoking, and believed that poisonous symptoms resulted from the juice of the tobacco being allowed to come into contact with the mucous membrane of the mouth in a moist state. Turkish women did not drink at all; some of the men drank *raki* to excess, but he had never known an instance of alcoholic amblyopia from this cause. On the other hand, he had met with eight instances of alcoholic and two of tobacco amblyopia in foreigners resident in Turkey.

Living and Card Specimens.—Mr. Critchett: New Instruments (new Fixation Forceps and Linear Knife).—Mr. Higgins: Result of Operation by Cautery for Conical Cornea.—Mr. Gunn: Growth of New Lens Fibres after Spontaneous Absorption of Traumatic Cataract.—Mr. Doyne: Condition of Retina Suggestive of Cysticercus.—Mr. Hartridge: Iridiæmia with Congenital Dislocation of Lenses.—Dr. Wells: Case of Frontal Mucocele.—Mr. Juler: (1) Albuminuric Retinitis. (2) Persistent Hyaloid Artery.

RECENT LITERATURE.

A. RETINA. OPTIC NERVE. CENTRES.

ARMSTRONG, S. T. Colour blindness in the Mercantile Marine of the United States.

Brit. Med. Jour., Jan., 28th, 1888, p. 188.

McKEOWN, D. Atrophy of the optic nerves treated by pilocarpine.

Brit. Med. Jour.; Jan., 28th., 1888, p. 189.

SEGUIN. Hemi-anôpsia of peripheral origin. Hemi-optic pupillary reaction.

N. Y. Med. Jour., Dec. 31st, 1887.

B. UVEAL TRACT. VITREOUS AND AQUEOUS. LENS.

Irrigation and after-treatment in cataract extraction.

Brit. Med. Jour., Jan. 28th, 1888, p. 199.

HUGHES, HENRY. Die Entstehung der Lederhautberstungen und Aderhautrisse.

Arch. für Ophth., XXXIII., 3, p. 21.

C. CORNEA. CONJUNCTIVA. SCLERA.

MULES. Treatment of ophthalmia neonatorum.

Brit. Med. Jour., Feb. 2nd, 1888, p. 244.

OWEN, D. C. LLOYD. Note on the purulent ophthalmia of infants and its treatment.

Birmingham Med. Rev., Jan., 1888, p. 3.

RAEHLMANN. Über den histologischen Bau des trachomatösen Pannus.

Arch. für Ophth., XXVIII., 3, p. 1.

D. ACCOMMODATION. REFRACTION. MOTOR APPARATUS.

HOLDEN, W. A. A new instrument for testing insufficiencies of the recti muscles.

Arch. of Ophth., Dec., 1887, p. 403.

MONOYER. Détermination de l'amétropie par l'observation des phases de chatoiement et d'obscurité pupillaires dues aux mouvements de l'image aérienne.

Rev. Gén. d'Ophtal., Dec. 1887.

STEVENS, G. T. The recognition and treatment of insufficiencies of the ocular muscles.

N. Y. Med. Rev., Dec., 1887, p. 805.

A NEW STEREOSCOPE.

DESIGNED BY ROBERT W. DOYNE,

SURGEON TO THE OXFORD EYE HOSPITAL, AND ST. JOHN'S
HOSPITAL, COWLEY.

This instrument has been designed for the purpose of thoroughly carrying out orthoptic training of the eyes, to which attention has of late been so much drawn.

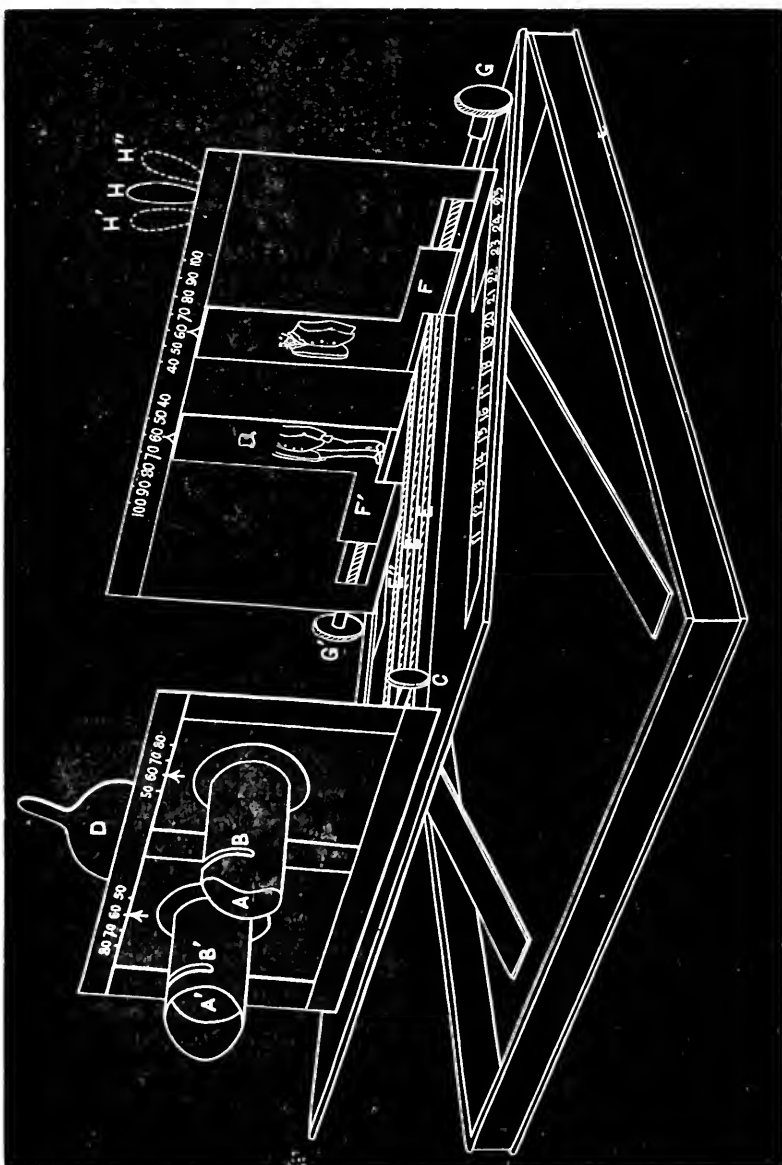
By its use it is hoped that the necessity for tenotomy in cases of squint may become less frequent, and where an operation is essential, binocular vision may be readily re-established, now quite an exceptional result.

As a diagnostic instrument, too, it affords a ready means of testing binocular vision, the power of the ocular muscles in convergence and divergence, and also relative accommodation and relative convergence.

It is so constructed that the normal movements of accommodation and convergence can be correctly imitated for rays varying from parallelism to divergence from a point at 25 c.m. distant from the eyes; also by a simple contrivance either of the two movements can be exercised independently of the other. Moreover, the instrument can be adapted, with inappreciable error, to any base-line between the pupils varying from 50 mm. to 75 mm.

In the position for rest that corresponds to normal distant vision, the back frame carrying the picture plates (F, F') is at a distance of 25 c.m. from the 4 D lenses (A, A'), as shown by the centimetric scale at the side. The relative position of the picture plates, as shown by the millimetric scale on the back frame, is regulated

F



according to the patient's base-line. If there be any ametropia present in the patient under examination, the proper correction is placed in the slits (B, B').

When the handle (F, F') is turned with the lever in the position of H, the back frame, carrying with it the picture plates, approaches the eyes, at the same time the picture plates approach each other, inducing convergence of the optic axes, exactly proportionate to the amount of accommodation called into play. When the lever is in the position of H', the convergence movement alone is exercised, the back frame remaining fixed, while the picture plates approach each other. When the lever is in the position of H'', the accommodation alone is exercised, the back frame moving backwards and forwards while the relation of the picture plates to each other is unaltered. The movement of the back frame takes place on one of the racks (E, E' E''), that one being geared which corresponds to the base-line of the patient. It is by means of these three racks that the error of a varying base-line is compensated; it never amounts to half a dioptré when the appropriate rack is employed.

The handle (C) regulates the eye-pieces according to the base-line of the patient, and their relative position is shown by the millimetric scale on the fore frame.

One or the other eye can be temporarily or permanently shut off at will by the shutter D.

The pictures employed differ from the German ones now in use by corresponding with each other to a considerable extent, in order to encourage fusion, while one marked detail is omitted in each as a test object.

The instrument (price £5 10s.) can be obtained from Messrs. Pickard & Curry, 195, Great Portland Street, London.

ERIK NORDENSON (Stockholm). Detachment of the Retina: An investigation of its pathological anatomy and pathogenesis. With an introduction by Dr. Th. Leber. Wiesbaden, J. F. Bergmann, 1887.

(Continued from p. 46.)

Chapter III. deals with the connection between detachment of the retina and myopia. Von Graefe appears to have been the first to note detachment of the retina in eyes affected by posterior sclero-choroiditis, which in his opinion was almost a synonym for myopia; he attributed it to the extension of the sclera and choroid, and a consequent loosening of the connection between the choroid and retina. Donders pointed out that myopic eyes are much more predisposed to retinal detachment than are eyes of other refraction. Statistics of its frequency among myopes were compiled by Horstmann and Schleich, who in a total of more than 4,000 myopic eyes found detachment of the retina in rather more than three per cent. (It seems likely that this is very much higher than the actual percentage of retinal detachment among myopes in general, for very many non-suffering myopes never consult an oculist, whereas nearly every myope who suffers a sudden impairment of sight through detachment of the retina does so. P. S.) That myopic eyes are much more liable to retinal detachment than eyes of other refraction is amply proved by statistics. The figures cited by Nordenson from various observers show that in a total of more than 1,100 cases of spontaneous detachment of the retina myopia was present in nearly 80 per cent.

Iwanoff believed that the cause of the detachment in myopia is that, while the tunics of the eye elongate, the vitreous body does not increase to a corresponding degree, and that the detachment of the vitreous thus produced leads, as above described, to detachment of the retina. De Wecker, as already stated, pointed to the important influence of rupture of the retina. Leber, arguing from the fact that the same accident sometimes occurs in emmetropic and hypermetropic eyes, regards the vitreous not merely as being left behind by the elongation of the tunics, but as actively

shrinking through changes in its own substance. This shrinking he holds to be a result of choroiditis, and the predisposition of the myopic eye to detachment of the retina he attributes to the common presence of choroiditis in myopic eyes.

Since Iwanoff drew attention to the importance of vitreous detachment as a precursor of retinal detachment, pains have been taken to establish the diagnosis of this condition in the living eye. The chief investigations of the subject are those made by Weiss, who, in 1879, published a description of a light-reflex observed by him in the fundus of myopic eyes, and believed to represent a detachment of the vitreous. The appearance in question is that of a bright streak forming a curve around and at a short distance from the nasal side of the papilla; the higher the myopia the further is the streak from the margin of the papilla, and the further also its situation in advance of the plane of the retina. Weiss believed it to be a reflex from the adjacent limiting surfaces of two optically different media. He carefully examined more than 1,000 eyes of school children and found this reflex in 38 per cent. of them. It was much commonest in myopic eyes, but not limited to these; in M, E, H its relative frequency was as about 3, 2, 1. In a large proportion of the myopic eyes Weiss found also certain appearances which are believed to indicate an active elongation of the globe, viz., a partial displacement of the choroid in such a way as to overhang and cover the nasal margin of the disc, and to separate and retract from the temporal side—a displacement outwards in relation to the papilla. From these observations Weiss inferred that the light-reflex represents a detachment of the vitreous and an incipient or progressive elongation of the tunics. He further studied the anatomical changes by dissection in six myopic eyes and found detachment of the vitreous in all. The separation of vitreous from retina varied much in amount: in an eye of nearly normal length the interspace was only 1.5 mm., while in eyes 30 and 31 mm. in length the posterior limit of the vitreous corresponded with the equator of the globe.

If the light-reflex described by Weiss, and seen by him in 8 per cent. of the juvenile eyes examined, really indicate

vitreous detachment, and if vitreous detachment tend to induce retinal detachment, then the latter serious accident should be much commoner than it actually is ; and this difficulty is by no means removed by the fact pointed out by Nordenson, that the complication with the retina occurs usually late in life ; more than 50 per cent. of cases of retinal detachment in myopic eyes occur after the fiftieth year. The relation between the light-reflex described by Weiss and the ultimate detachment of the retina is certainly less close than has been suggested. (For a satisfactory and different suggestion as to the cause of certain reflexes often visible in the fundus of juvenile eyes the reader is referred to a paper by Gunn in the Royal London Ophthalmic Hospital Reports, vol. xi., p. 348, 1887.)

The fact that the posterior limit of the vitreous is found as far forward as the equator of the globe in many of these cases is urged by Nordenson as a proof that the condition in myopic eyes, as in eyes of other refraction, is not due simply to the elongation of the globe, but largely to active shrinking of the vitreous, though the elongation is doubtless a strongly predisposing and auxiliary cause. Statistics show that choroiditis is present in very many myopic eyes, and especially in those severe cases of high degree which are sometimes found in persons who have not over-used their eyes on near objects. Statistics show also that in these severe cases in which choroiditis is well marked, detachment of the retina is particularly apt to occur. The whole of the facts therefore support the view of Leber, that the retinal detachment met with in myopia is essentially due to choroiditis, the sequence being : choroiditis ; effusion into and ultimate shrinking of the vitreous ; separation of the vitreous from the retina with secondary exudation between the two ; rupture of the retina by the traction of the shrinking vitreous ; escape of fluid outwards through the aperture loosening and separating the retina from the choroid.

Chapter IV. describes in elaborate detail Nordenson's own anatomical examination of a series of eyes blinded by detachment of the retina. A brief outline only can be given here.

Case 1.—A man aged 29, with progressive myopia of 8D.

September, 1883, photopsia of left eye. October of the same year, metamorphopsia downwards; slight detachment of retina upwards, which disappeared. February, 1884, fresh detachment downwards, with a large rupture of the retina and deepening of the anterior chamber. October, 1884, distressing photopsia both of the blind and of the other eye; enucleation of left eye. Summary of the morbid process as revealed by dissection:—Chronic choroiditis; fibrous thickening of the vitreous; detachment of the vitreous both posteriorly from the retina and anteriorly from the zonula; detachment of the retina, with a rupture in the lower, and a small microscopic rent in the upper, half; chronic retinitis, especially in the lower half. The inferred sequence of events is described as follows:—The disease began with an insidious choroiditis, the inflammatory products of which caused, in places, a more or less firm welding together of the choroid and retina. The vitreous, disturbed in its nutrition by reason of the choroiditis, acquired a more fibrous structure. Shrinking of its stroma caused, in the first place, the slight detachment of the retina above, seen in October, 1883, probably with a slight tear. Further shrinking caused an increasing separation of the vitreous from the detached and ruptured retina, which remained hanging freely between vitreous and choroid, and approached the one or the other according to the various movements of the eye and positions of the body. Temporary replacement of the retina against the choroid was probably induced by rest in bed. The shrinking of the vitreous was greatest in the lower half of the eyeball, and here it caused an extensive rent in the retina through which a large quantity of fluid passed from the sub-vitreous into the sub-retinal space, separating the retina widely from the choroid. The natural adhesion of the retina to the choroid was augmented in places by inflammatory products, and at these places ruptures of the retina occurred. After the retina became detached, the points of adhesion became drawn out into long thin threads. The shrinking of the vitreous caused traction not only on the retina, but on the structures lying anteriorly to it, for the ciliary processes and lens were drawn backwards, causing a deepening of the anterior chamber. An intra-ocular hemorrhage probably

occurred during the progress of the disorder, for pigment masses were found freely scattered throughout the interior of the eye : in the retina immediately adjacent to the rents, in the vitreous, in the post-zonular space, on the zonula fibres, in the anterior chamber, and in the meshes behind the plexus venosus ; in the anterior chamber it lay, by reason of gravity, chiefly in the lower half. Points of special interest in this case are that the detachment was idiopathic, that clinically there was no evidence of inflammation, and that with a normal tension the anterior chamber was deepened.

Case 2.—A man, aged 49, with M. 16D. Right eye, total spontaneous detachment of the retina. The pathological changes discovered were chronic choroiditis, thickening and separation of the fibrous vitreous, chronic inflammation, detachment and rupture of the retina, and capsular cataract. They were essentially the same as those in case 1, but in a more advanced stage.

Case 3.—A man, aged 25, with M. 3D. Left eye, sudden failure of vision ; six days later, detachment of retina outwards, and numerous vitreous opacities diagnosed ; iritis four weeks later ; in the twelfth week, the vitreous being clearer, a rent visible in the detached retina. In the following year, closure of the pupil with high tension and amaurosis ; enucleation. The dissection revealed chronic choroiditis, fibrous thickening, and posterior detachment of the vitreous ; chronic inflammation, detachment and rupture of the retina ; iritis, with closure of the pupil ; capsular cataract. This case differed from the preceding in the early extension of the inflammation to the anterior part of the uveal tract. This led to occlusion of the pupil and retention of the albuminous secretion from the ciliary processes behind the iris, causing the iris to be pushed forward against the cornea, and the shrunken vitreous to be separated from the lens and pushed backwards from it. The bulging iris closed the angle of the anterior chamber and caused rise of tension.

Case 4.—A woman, aged 52, emmetropia, spontaneous

detachment of both retine. Right eye, detachment with rupture ; subsequent severe irido-cyclitis ; retraction and bending of the iris, with much deepening of the anterior chamber ; rise of tension ; enucleation. Left eye, detachment of retina without visible rupture ; intermittent irido-cyclitis, with temporary retraction of the iris and temporary rise of tension. The dissection showed not only chronic choroiditis and the other changes described in the previous cases, but, in addition, a detachment of the choroid showing traction on the part of the vitreous on all the structures surrounding it. Points of special interest are the emmetropia, the close connection of the retinal detachment with well-marked irido-cyclitis, and the extreme deepening on several occasions of the anterior chamber with high tension. With regard to the deep anterior chamber, Nordenson goes out of his way, we think, to find an explanation. He assumes a cramp of the ciliary muscle which, pressing on the contents of the anterior chamber, drives the iris and lens backwards. In favour of this idea he mentions that atropine was used with benefit, in spite of the increased tension, the suggestion being that it did good by relaxing the ciliary spasm. He rejects, without reason, as we think, the supposition that a morbidly albuminous secretion from the ciliary processes, unfit for easy filtration through the angle of the chamber, was retained therein, deepening the chamber and raising the tension of the whole globe. This state of things is characteristic of so-called serous iritis, and in this disorder atropine often does good and lowers tension, not by removing a hypothetical ciliary spasm, but by lessening the inflammation.

In a sub-section of this chapter the author discusses the occurrence of retinal detachment in connection with retinitis albuminurica. From a careful analysis of 12 recorded cases, he draws the following conclusions :— Retinal detachment in retinitis albuminurica occurs in both sexes (7 females, 5 males). It usually affects both eyes (10 cases bilateral, 2 unilateral). In connection with pregnancy it runs a favourable course (in 4 cases complete replacement was observed, 11 days, 6 weeks, several months, and 2 years

respectively, after delivery.) Restitution of vision, sometimes complete, accompanies the replacement in these cases. The fact of the recovery has suggested the belief that the cause of the detachment is simply a dropsy between choroid and retina which subsides, when the kidney mischief subsides, together with the œdema in other parts of the body. This explanation is unsatisfactory, however, for those cases in which the detachment occurs quite suddenly, as it did in some of the recorded cases. Nordenson concludes that, while slight detachments of the retina in the neighbourhood of the papilla are due to changes in the retina itself—disease and blocking of vessels, fibrinous exudations, etc.—the larger detachments of the comparatively healthy retina in the equatorial region must be referred to an antecedent malnutrition and shrinking of the vitreous.

A second sub-section deals with detachment of the retina in cases of choroidal tumour. Such tumours necessarily separate the retina from the choroid by their bulk, but, as the detachment is commonly much greater than this mechanical pressure would cause, there is evidently another factor at work. The fact that the vitreous is sometimes found separated from the retina in these cases shows that an active shrinking of the vitreous is concerned in this as in other forms of retinal detachment. Further observations are required to show to what extent this cause is operative, and to explain the lowering of tension observed by Brailey and others in the earlier stages of the disorder.

Chapter V. briefly describes the occurrence of retinal detachment in the eyes of horses. It is associated with disease of the uveal tract, and depends in all probability upon shrinking of the vitreous, as in man.

Chapter VI. presents a statistical analysis of 126 instances of spontaneous detachment of the retina, diagnosed with the ophthalmoscope in the Göttingen University eye-clinic, during the six years from August, 1880, to August, 1886; all cases with a history of injury, or with a diagnosis of intra-ocular tumour, were excluded. The 126 eyes belonged to 117 persons. In 9 cases the disorder was bilateral. In 16 cases the disorder occurred in the useful eye of a person whose fellow eye was blind. Of the 117 persons, 85 were

males, 32 females. The figures show an increasing frequency with the advance of life ; rather more than 50 per cent. of the patients were more than 50 years old.

The tension tested by the fingers was found normal in 62 eyes, in some of which it became sub-normal later. In the quite recent cases it was normal. In 58 eyes, first examined some time after the occurrence of the detachment, the tension was sub-normal. Increased tension was present in six eyes only ; in one of these irido-cyclitis had supervened, and caused blocking of the pupil with bulging of the iris, as already described ; in 3 there was acute irido-cyclitis, with deepening of the anterior chamber ; in the two others, belonging to one patient, the detachment was associated with glaucoma.

External evidence of inflammation was absent at the outset in all the cases ; in 17 of them iritis or irido-cyclitis supervened after the occurrence of the detachment ; in one of these hypopyon appeared and quickly disappeared. The iris was tremulous in 10 eyes. The anterior chamber was deepened, and the iris retracted in 6 eyes in which there were signs of iritis ; the iris was retracted, and the chamber deepened peripherally in two eyes in which there was no trace of iritis.

The lens showed partial opacities, striate, anterior cortical or posterior cortical, in 17 eyes.

The vitreous showed visible changes in 97 eyes ; in the remaining 29 no such changes are mentioned in the record, but in 11 of them a rupture of the retina was seen. The changes consisted of fine smoke-like opacities, visible only with the plane mirror, or fine movable flakey and membranous opacities, slightly obscuring the fundus, or diffuse turbidity. In 4 eyes there were opacities manifestly due to hemorrhage.

The situation and extent of the detachment were various. In 27 eyes it was total, obscuring the entire fundus. The most frequent situation was downwards (31 eyes) ; the next, upwards (22 eyes) ; in 14 eyes it lay upwards, outwards, and downwards. The upper half of the retina was more or less detached in more than two-thirds of the whole number. Rupture of the retina was looked for in 119 eyes.

it was found in 46 of these, *i.e.*, in 38 per cent. It was met with in all four quadrants of the fundus, but very much more frequently (23 times) upwards and outwards than elsewhere. Two ruptures were discovered in one eye ; three in another. In every case the rupture was situated more or less near to the periphery, never in the central region of the fundus. The ruptures had the appearance of round or three-cornered holes, or of gaping rents ; the edges of the rent were never rolled outwards. In 5 eyes a rupture, clearly seen and described, later became invisible, being either hidden by an overhanging fold of the retina, or reunited so as to leave only a small whitish line. In 5 cases of clearly seen rupture and detachment of the upper half of the retina, the sub-retinal fluid subsequently sank downwards, separating the lower half, while the portion first detached reapplied itself to the choroid.

The clinical records give some evidence as to the time when the rupture of the retina occurs—whether before, simultaneously with, or after, the detachment of the retina. In a series of cases in which a sudden loss of sight was undoubtedly due to a sudden detachment of the corresponding portion of the retina, a rupture was found corresponding with the position of the first loss of sight. This points strongly to the occurrence of the rupture before or at the moment of the detachment. It is true that a rupture has been seen to occur in an already detached retina, but it is likely in these cases that a previous rupture had occurred and escaped notice. There are several conditions which may render the discovery of a rupture impossible : the media, especially the vitreous, may be too turbid, as it actually was, in many of the cases cited ; the rupture may lie too near to the periphery ; it may be hidden by a fold of retina ; it may, sooner or later after its occurrence, become closed ; the portion of the retina originally ruptured and detached may become reapplied to the choroid, in which case the scar easily escapes notice.

The choroid showed ophthalmoscopic changes in 32 eyes : exudations in 16, and irregularity of pigmentation in 16 more. Staphyloma posticum of large extent was present in 20 myopic eyes. The myopia varied from 3D to 8D.

The refraction was determined in 97 eyes. The result was M. in 58; E. in 26; H. in 13.

The disturbance of vision was sudden in 64 eyes, gradual in 31. In the remaining 31 the manner of its occurrence could not be ascertained.

Detachment of the retina has been met with, though very rarely, in eyes with glaucomatous excavation of the disc and high tension. The author, while believing that inflammatory changes in the uveal tract are concerned both in the glaucoma process and in that of retinal detachment, holds that there is no special causal relation either way between the glaucoma and the detachment.

Chapter VII. summarises the conclusions of the author, and describes, in a concise manner, the pathology of retinal detachment as expounded in the foregoing chapters. An alphabetical list, presenting the previous literature of the subject, follows. Twenty-seven pages of admirably executed lithographs, with descriptive letterpress, complete the volume.

Dr. Nordenson's highly elaborate treatise will certainly be welcomed by all students of ophthalmology as one of great and permanent value.

P. S.

SEGUIN (New York). On Cortical Hemianopsia.
Archives de Neurolog., Vol. XI., 1886, p. 176.

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- GRIFFITH (Manchester). Four cases of Bitemporal Hemianopsia. *Medical Chronicle*, Jan., 1887.
- SCHÄFER (London). Experiments on Special Sense Localisations in the Cortex Cerebri of the Monkey. *Brain*, Vol. X., p. 362.

Before reviewing these contributions to our knowledge of the visual apparatus, it may be well, as Dr. Seguin has done in his admirable paper, to refer to the question of nomenclature. "*Hemianopsia*" is now pretty generally accepted as meaning loss of half the visual field; *horizontal* if the upper or lower half be lost, *vertical* if the temporal or nasal half be lost. Horizontal hemianopsia is extremely rare, and practically only vertical hemianopsia is of interest to the neurologist. Of this latter we distinguish, in referring to both eyes, three varieties: (1) temporal (or sometimes bitemporal), (2) nasal, and (3) lateral, or homonymous, distinguishing this last as right or left. It will be seen that these terms are free from ambiguity, except that temporal and nasal may not be understood as referring to both eyes. The use of the term hemiopia, whether as referring to the retina or the field of vision, is now practically abandoned. Dr. Gowers we note in his just issued volume on Diseases of the Brain, adopts hemianopia, which is quite unambiguous, although not etymologically so correct as hemianopsia.

Dr. Seguin, in his paper in the Archives, has collected forty cases of hemianopsia due to cortical lesions, as ascertained by autopsy, and also five cases of traumatic origin without autopsy. These forty-five cases he classes as follows:—

Four cases where the lesion was not clearly defined, and which are useless for localisation.

Three cases of lesion affecting parts known to be independent of vision, and where the hemianopsia resulted from compression.

Six cases of lesion of the lateral geniculate body or of the optic thalamus or of both.

Eleven cases of lesion of the white substance of the occipital lobe.

Five cases of traumatic lesion of the occiput and subjacent cerebrum.

Sixteen cases of lesion of cerebral cortex or immediately subjacent white substance.

In this last group are four cases, one of them observed throughout by himself, where the lesion, always the same, was sufficiently defined to help in solving the problem of the localisation of the cortical visual centre in man. Of these four cases, and of one of the traumatic cases, Dr. Seguin gives detailed reports, and also diagrams showing the lesions. In the traumatic case the right lateral hemianopsia had been the sole symptom for twenty-three years. It was a case of bullet wound, and the man was still alive. Two scars showed the points of entrance and of exit of the bullet, and Dr. Seguin tried to repeat the lesion on the dead body by trephining the skull at points corresponding with the scars, and passing a hank of thread between the apertures. This experiment seemed to show that the bullet had passed over the dorsal surface of the left occipital lobe, across the parietal lobe, to the neighbourhood of the ascending parietal convolution, damaging the optic fasciculus on its way to the cuneus. Of the other four cases recorded at length, two were instances of softening apparently from arterial degeneration, one (his own) of softening from embolism, and the fourth was a case of tumour. In all four cases the lesion affected the cortical tissue of the cuneus, *i.e.*, the median surface of the occipital lobe between the vertical or parieto-occipital and the calcarine fissures, occasionally extending somewhat below the calcarine fissure on the occipito-temporal area.

Of the other forty cases, Dr. Seguin gives a full *résumé* in tabular form, and from all the cases he draws the following conclusions:—

(1) That lesions of the internal surfaces of the temporal lobes, or even of other portions of the base of the hemispheres, can produce hemianopsia indirectly by compressing the primary optic centres (*i.e.*, the anterior corpora quadrigemina and the geniculate bodies) or the optic tracts and the chiasma.

(2) That lesions of the lateral geniculate body, or of the postero-lateral portions of the optic thalamus, can cause hemianopsia, in general accompanied by hemiplegia and hemianæsthesia, sometimes by hemianæsthesia alone.

(3) That a lesion of the white substance of the occipital lobe on the level of the most posterior fibres of the internal capsule can produce hemianopsia, alone or accompanied by hemianæsthesia.

(4) That lesions of the inferior parietal lobule, including the supramarginal and angular gyri with the subjacent white substance, can cause hemianopsia with or without the other symptoms (hemiplegia, loss of muscular sense, word deafness).

(5) That a more extensive lesion, comprising the centre of speech, the motor convolutions, and the parts above named (4), due ordinarily to embolism or thrombosis of the entire Sylvian artery, can produce, when on the left side, aphasia, alexia, hemianopsia, and hemiplegia.

(6) That lesions of the occipital lobe, cortex and subjacent white substance, produce blindness when they are bilateral, hemianopsia when they are unilateral.

(7) That a lesion of the cuneus and the occipito-temporal convolutions adjacent produces hemianopsia of the opposite side.

The case recorded by Bouveret falls under the sixth of the above-mentioned categories. The autopsy showed symmetrical softening of the cuneus and of the neighbouring portion of the occipito-temporal surface, extending somewhat farther forward on the right than on the left side. The softening was due to plugging of both posterior cerebral arteries, most probably due to embolism from a disintegrating thrombus in the left ventricle. With the exception of the above-mentioned areas, the cortex, the grey nuclei, and the white matter of cerebrum and cerebellum was to all appearance healthy. The visual system was carefully examined throughout. The kidneys showed granular contraction, and the left ventricle of the heart was much hypertrophied. The patient, a man aged 72 years, lived seventeen days after the occurrence of the lesion, which was apparently sudden. He was found motionless by the wayside, grasping a tree in his arms. His intelligence was much clouded, but he was quite conscious, and answered questions slowly. Memory was extremely defective. At first there was no paralysis, but a slight weakness of the left side developed just before

death. General sensation was good. Taste and smell were not tested. The one marked symptom present from the first and persistent throughout was absolute blindness. It is noted that the pupils were "moderately dilated, not very sensitive to the action of light;" an interesting fact in relation to "hemiopic pupillary reaction," to which we shall refer presently.

The above-mentioned cases go far to prove conclusively that each cuneus has a hemiopic relation with the two retinae, and this is now almost universally accepted. It will be remembered that Ferrier has stated, in the last edition of his "Functions of the Brain" (*v. Ophth. Rev.*, vol. VI., p. 121), that in monkeys the occipital lobes can be injured or cut off bodily almost up to the parieto-occipital fissure, on one or both sides simultaneously, without the slightest appreciable impairment of vision. Schäfer has now repeated these experiments, and records in his paper in "Brain" very positive results. He finds that unilateral destruction of the occipital lobe produces immediate and permanent hemianopsia, that bilateral destruction produces immediate, permanent, and complete blindness. These results are in agreement with pathological observation, and will be readily received. He seeks to explain Ferrier's negative result by supposing that the occipital lobes were incompletely removed. In a case of bilateral removal of the occipital lobes, Schäfer found that a certain amount of vision was retained in the upper parts of the visual fields. Post-mortem examination showed that the destruction of the lobes below was not so complete as in the case where there was complete blindness. It is interesting to note that this experiment seems to confirm Munk's belief that the various parts of the retina are supplied by various parts of the occipital cortex, the anterior part of the visual centre in the dog supplying the upper part of the retina, and the posterior part of the centre the lower part of the retina.

Ferrier locates the visual centre in the occipito-angular region. He finds that destruction of an angular gyrus causes a temporary blindness of the opposite eye, which disappears in 24 hours, while destruction of both angular gyri causes blindness of both eyes, lasting for four days with im-

perfect recovery. If the two gyri are destroyed successively at an interval of three weeks, a temporary blindness of both eyes occurs after the second operation. Ferrier from these facts draws the conclusion, expressed in his diagram of the optic apparatus, that each angular gyrus is related with the centres of both retinae, although more directly with that of the opposite eye. Schäfer has again repeated these experiments, and again has found an opposite result. Destruction of one or both angular gyri he finds produces no effect on vision whatever, either temporary or permanent. When he destroyed one angular gyrus deeply and completely, he obtained, not amblyopia of the opposite eye, as did Ferrier, but hemianopsia, lasting for a few days, gradually passing off and leaving vision unimpaired. This temporary hemianopsia Schäfer explains by vascular disturbance in the neighbouring occipital lobe produced by the severe operation. These opposing results, obtained by able and conscientious observers, are perplexing, and it would be premature to come to any final decision as to the relation of the angular gyrus to the visual function. An important fact, emphasized by Seguin, should be borne in mind in estimating the results both of experimental and pathological lesion of the angular gyrus. The optic radiations of Gratiolet, after leaving the internal capsule arch upward and backward over the posterior horn of the lateral ventricle, to reach the occipital lobe and perhaps mainly the cuneus. In doing so these fibres lie directly under the angular gyrus, and would therefore be liable to lesion in any injury affecting that area. The question is evidently one of much interest both to physiologists and neurologists, and it will doubtless receive further discussion on both sides.

The three cases of lateral hemianopsia which formed the subject of Seguin's paper, read before the New York Neurological Society, were all supposed to have a neural peripheral lesion. In each, one eye showed temporal hemianopsia, while the other was more or less completely blind. The lesion in all three cases presumably involved the chiasma. Seguin brought forward these cases chiefly as illustrating Wernicke's "hemipic pupillary reaction," or as Seguin prefers to call it, "hemipic pupillary inaction," and its value as a means

of diagnosis between cortical and peripheral hemianopsia. In hemianopsia of peripheral origin the optic reflex arc is interrupted for the blind half of the retina, while in hemianopsia of cortical origin it is not. Seguin showed in his cases, and also in the case of bitemporal hemianopsia exhibited at the same meeting by Brown, that a pencil of light thrown with a certain obliquity on the blind half of the retina caused no pupillary action. The obliquity required was 60° from the horizontal (? transverse horizontal). If the pencil of light had a less obliquity than this, a part of it by diffusion fell on the sensitive retina, causing pupillary reaction. Seguin states that for this examination of the pupil the patient must be in a dark room, must look in the distance and have the eye dimly illuminated. The light may then be focussed on the retina at different angles by means of the ophthalmoscopic mirror. (*v. Ophth. Rev.*, vol. vi., p. 169.)

The cases of bitemporal hemianopsia recorded by Brown and by Hill Griffith were none of them followed by autopsy. In all the lesion was certainly chiasmal, involving the crossed fasciculi of both optic nerves. In Griffith's first case, due probably to fracture of the body of the sphenoid, the complaint of failure of vision preceded by nearly nine months the development of the characteristic defects in the visual fields. In his second case the lesion was the solitary symptom, was stationary, and probably due to an osseous growth on the body of the sphenoid bone. In his third case the hemianopsia came on with temporary ptosis, left anosmia and some anæsthesia, suggesting hysteria, but the lesion was permanent. His fourth case, a miner, affected with nystagmus, came for blindness of the left eye, and showed in the right eye a sharply defined temporal defect for red and green, while the temporal field for white and blue remained normal. The right eye gradually recovered perfect vision, while the left, in recovering partly, showed temporal hemianopsia with defect of colour vision.

J. A.

L. LEPLAT (LIÈGE.) Investigations concerning the nutrition of the Vitreous Humour.—*Annales d'Oculistique*, Vol. *XCVIII*. September—October. 1887, p. 1.

In his record of these experimental researches, Leplat, first of all, passes in review several of the more important papers on the nutrition of the vitreous body, and gives his reasons for conducting his experiments on a plan which differs a good deal from those hitherto employed.

Schwalbe, by injecting a non-diffusible colouring matter into the pial sheath of the optic nerve, proved the existence of a path of communication between the lymphatic spaces of the nerve and the central canal of the vitreous.

Knies used ferrocyanide of potassium, and injected it either directly into the vitreous or subcutaneously. Leplat holds that no definite conclusions can be based upon the results obtained by injections into the vitreous, believing that such injection must necessarily cause increase of pressure in this body, the effect of which must be to set in motion a current from the vitreous to the aqueous, since we know that a difference in pressure in these two humours cannot be maintained for any length of time. There is nothing to indicate, however, that such a current obtains under normal conditions.

Hypodermic injections are also open to objection. Knies and Ulrich, who experimented in this way, allowed an hour and a half to elapse before enucleating the eye for examination. Since a diffusible substance, such as iodide of potassium, can be detected in the aqueous humour ten minutes after subcutaneous injection, this interval was evidently much too long to give satisfactory results. The immersion of the enucleated eyeballs in an alcoholic solution of perchloride of iron produced so much shrinking of the vitreous body that but little information could be derived from its microscopic examination. The use of ferrocyanide of potassium has elucidated one point, viz., the secretion of the vitreous by the ciliary body (Schick).

Schöler and Uthoff made use of fluoresceine, and dissected the eyes of the rabbits they experimented upon, a variable

time after the injection, and learned therefrom, that the intra-ocular fluids originate in the ciliary body. They, however, obtained no information as to the course taken by these fluids. Injections of Chinese ink directly into the vitreous have been made by Ulrich, and subsequently by Gifford, and the latter observer concluded that the elimination of fluid from the vitreous occurred at the papilla.

Panas,* following the lead of Bouchard, who discovered that cataract developed in rabbits fed on naphthaline, made a series of experiments on these animals, in search of facts bearing on the nutrition of the vitreous. He concluded from his researches that a nutritive current starts from the papilla, traverses the vitreous, the crystalline lens, and the aqueous, to leave the eye by Schlemm's canal. The present writer thinks these conclusions are not sufficiently proved, and that the conditions observed will do equally well for an intra-ocular current with a direction *towards* the papilla.

Stilling's hypothesis that the elimination of fluid from the vitreous takes place at the papilla, seems to M. Leplat the most probable, and though the experiments of Schwalbe and Gifford are evidence in its favour, he thinks it is as yet not proven.

The plan upon which Leplat worked was the same as that described by him in his paper on the "Regeneration of the Aqueous Humour,"† and was briefly as follows:—Two grammes of iodide of potassium, dissolved in water, were injected beneath the skin of a rabbit. After an interval varying from half an hour to 38 hours, the eyes were enucleated, frozen at once in a mixture of salt and ice, and while frozen divided into segments in a direction at right angles to their antero-posterior axes. These segments are indicated in the accompanying woodcut.



(1) The portion of the vitreous adjoining the papilla, A.

* *Idé Ophth. Review*, Dec., 1887, p. 353.

† *Annales d'Oculistique*, Jan.-Feb., 1887.

(2) A layer immediately anterior to this.

(3) A layer still more anterior, containing vitreous, and the posterior pole of the lens.

(4) A layer in which was included the bulk of the lens, and the most anterior part of the vitreous.

(5) The aqueous of the anterior chamber.

The 2nd and 3rd segments were divided into a central and two lateral portions.

Each portion was placed in a separate watch-glass and allowed to melt. From each glass a certain quantity (five centigrammes) was taken, and its reaction, with a given quantity of a solution of starch of known strength, ascertained, and the relative quantity of iodine calculated by the intensity of colour produced. The results published are the mean of many observations.

In eyes enucleated ten minutes after the injection, iodine was detected only in the aqueous humour ; it was present in the vitreous in 15 to 50 minutes, and then only in the most anterior layers, and in less quantity than in the aqueous. In 70 minutes it was spreading towards the papilla ; segments D now gave the starch reaction.

One and a half hours. The entire vitreous contained iodine, but the anterior layers gave a much deeper colour with starch.

Two and a half hours. The amount of iodine was still greater in the anterior parts.

Six hours. The colouration with starch had increased in intensity in the posterior segments, but was still less than in the anterior layers.

Nine hours. The reaction by segments K and B was much weaker ; the maximum reaction obtained by segments C and B.

Sixteen hours. Segment K gave scarcely any colour. The whole vitreous contained iodine, but in greatest quantity near the papilla.

Twenty-three hours. No trace of iodine in K. The reaction by segments F E and D was very feeble, while C and B gave a strongly marked reaction.

Thirty-eight hours. Segments A B and C only contained iodine, and the reaction of B was the weakest.

The more rapid appearance of iodine in the aqueous shows a greater activity of circulation in this humour than in the vitreous, in which latter the fluids have to filter between cellular elements, while the anterior chamber is free from obstacles, its channels of excretion are open, and the iris, by its movements, perhaps, assists in the circulation of fluids.

The quantity of iodine in the fluids secreted increases for about seven hours after the injection, and thenceforth diminishes. The regularity of this increase and decrease varies considerably in different animals ; in some rabbits the iodine reaches the vitreous 15 minutes, in others not for 45 minutes, after its introduction beneath the skin.

Leplat remarks that it seems fair to conclude from these experiments that the nutritive fluids of the vitreous are secreted by the ciliary body, a conclusion already arrived at by previous experimenters ; but he emphasises the statement that it is from the ciliary body *alone* that these fluids come. From this point the current travels backwards, and that portion which enters the central canal of the vitreous flows rapidly towards the papilla. The maximum of saturation by iodine of the anterior portion of the vitreous is reached in seven hours, and then gradually diminishes simultaneously with a maximum saturation of the layers more posterior ; in other words, the iodine enters the vitreous body anteriorly (at the ciliary processes), and leaves it posteriorly (at the papilla). Leplat asks whether his results will bear a different interpretation ; whether, as Ulrich and Panas suggest, the whole uveal tract supplies the vitreous with nutritive fluid, and not alone the ciliary body? Certain clinical facts seem to favour this latter view. In choroiditis, not involving the ciliary part, opacities are met with in the vitreous ; in myopia the posterior layers of this humour are sometimes liquefied. It is an admitted fact that the rods and cones derive their nourishment from the choroid, but it is difficult to imagine that nutrient fluid should traverse the retina, which has a quite separate blood supply, in order to reach the vitreous ; if so, it should contribute to the nutrition of this tunic (the retina), which it clearly does not, as is evidenced by the loss of transparency and function

which result from embolism of the central artery. And supposing that there be a considerable current from the choroid, through the retina to the vitreous, how are we to explain the progressive increase and subsequent decrease of the quantity of iodine in the vitreous from before backwards in these experiments?

The author then undertook a series of purely physical experiments, to satisfy himself that the maximum of saturation with iodine really did travel from the point of introduction into the vitreous to that of elimination from it.

He filled bladders of very thin caoutchouc with compressed sponge, which, when moistened, slightly distended the elastic bags. These were then hermetically sealed. The wall of the bladder was pierced by a canula, and at the opposite side a number of pin-holes were made. Through the canula, water or solution of iodide of potassium, could be introduced at a constant pressure. These bladders were examined in precisely the same way as the rabbits' eyes, *i.e.*, frozen and divided transversely into four parts.

The result was that if the experiment were stopped while the iodide solution was still entering (period of secretion into the vitreous) the quantity of iodide was found to be greatest near the point of entry; if stopped after the iodide solution had ceased to flow into the sponge (period of elimination from the vitreous), the quantity of iodide was greatest near the point of exit. These facts seem quite in accord with those observed in the rabbits' eyes, and are valuable evidence in favour of the author's contention.

The account of these researches, of which our abstract is necessarily meagre, is given by Leplat in elaborate detail. His results, which can scarcely be doubted, strongly support the theory of which Stilling has been the chief champion, that elimination of fluids from the vitreous occurs at the optic papilla, and have an important bearing in regard to the current theories of glaucoma. [A further contribution which the author promises, relating to the part played by the aqueous in increased tension of the eyeball, will be welcome.

J. B. L.

SCHMIDT-RIMPLER (Marburg). The Influence of peripheral stimulation of the Retina on Central Vision. *Bericht über die XIX^{te} Versammlung der Ophth. Gesellschaft, Heidelberg, 1887.* pp. 76—82.

The influence which is exerted upon central acuteness of vision by illumination of the peripheral part of the retina has received but little attention hitherto, in either its physiological or pathological bearings. Schmidt-Rimpler was led to make a series of experiments in this direction by observing one evening while reading by lamplight that the print appeared blacker and more distinct to his right eye, which was in the light of the lamp, than to his left eye, which was in the shade. The difference was especially noticeable when the print was held at the greatest distance at which it was legible.

Brücke had observed long previously that a white surface appears greenish to an eye lighted from one side, and reddish to an eye which is shaded, but these "contrast phenomena" will not suffice to explain the increase in acuteness of vision of the lighted eye, for black letters on a "subjectively" green ground do not appear more distinct than those on red.

Sewall and Urbantschitsch have both recorded some observations on this point, and concuded that while the central acuteness of sight is increased by moderate illumination of the retinal periphery a more intense illumination has the opposite effect. This is very easily demonstrated by anyone. If when looking at a distant landscape in the dusk of the evening (with one eye closed) a lighted taper be held so that its light fall sideways upon the observing eye, the outlines of hills, &c., which were previously visible will be rendered quite unrecognisable.

Schmidt-Rimpler's experiments were made upon doctors, students, and patients, and in the following way:—In a darkened room Snellen's test-types were hung and lighted by a lamp hidden from the observer by a screen. The vision of each eye was then measured by these types. Light from an Edison lamp was thrown upon the sclerotic of the eye under

examination ; a telescopic arrangement of tubes enabled the experimenter to vary the distance of this light from the patient's eye, and a convex lens concentrated the rays upon the sclera, so that the illumination could be limited to a very small area. A screen prevented rays from this lamp entering the pupil. In some cases the eyes were previously atropinised.

As a result of these experiments it was found that in nearly all healthy eyes a moderate illumination of the sclera, and of the retina through the sclera, definitely improved central acuity of vision ; the letters appeared more sharply defined and blacker, and many previously illegible were easily deciphered. In only one instance, that of a student, was vision reduced.

If, however, the light from the lamp were sharply focussed on the sclera, a striking diminution of the acuteness of sight resulted.

That the improvement in vision was not due to narrowing of the pupil is manifest from the diminution which occurred with the stronger illumination, and from the fact that the same results were obtained in eyes under the influence of a mydriatic.

The intensity of the light thrown on to the sclerotic, necessary to produce these effects, varied somewhat in different individuals. In eyes sensitive to light a weaker illumination sufficed both to increase and diminish the central visual acuity.

In patients suffering from divers diseases of the eyes the effect of peripheral illumination was more noticeable than in healthy people. In some cases of optic neuritis, atrophy, cataract, and simple glaucoma, the smallest obtainable electric light thrown on to the sclerotic reduced the central acuteness, while in one case of disease of vitreous and detachment of retina sight was improved. However, the number of such examined was too small to allow any definite conclusion to be drawn.

Several patients in whom a low degree of scleral illumination caused deterioration of sight complained greatly of being "dazzled" by the light. This, which is a complaint often met with in practice, has been generally ascribed to

too great illumination of the macular region of the retina, but Schmidt-Rimpler's experiments led him to think that it may not infrequently be due to light falling upon the peripheral part of the retina. Following up this idea he made some spectacles of plane glass and blackened the periphery, leaving a clear central part 1 c.m. in diameter. By this means vision in some cases went up from $\frac{4}{18}$ to $\frac{4}{9}$, and a few patients expressed a desire to wear such spectacles constantly; Schmidt-Rimpler objected to this, however, in consequence of their unsightliness!

As a practical outcome of his experiments, Schmidt-Rimpler draws attention to the advisability of examining patients with defective sight under conditions in which the peripheral part of the retina may be lighted or shaded; in other words, testing the acuteness of vision, first with the patients facing the window or lamp, and secondly with the source of light behind them. The results obtained in the two trials will often be found to differ considerably.

J. B. L.

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ATROPHY OF THE OPTIC NERVES ASSOCIATED WITH DROPPING FLUID FROM THE NOSTRIL.*

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Samuel S., aged 65, an engineer, consulted me on January 21st, 1887. For twelve years he has suffered from what he calls chronic influenza. The discharge has not been quite so bad for the last three years, and he thinks that when it diminished in amount his vision began to fail. The sight of the left eye began to fail markedly, that of the right eye slightly, about two years ago. He has not suffered from headaches for twenty years. There is no history of heredity. He drinks a very small amount. His sense of taste is normal. His sense of smell is not very acute; his wife says he does not seem to notice a bad smell. The soft palate and the nasal mucous membrane are normal, and there are apparently no polypoid growths. There is no thyroid enlargement and no proptosis. He has more discharge from the left nostril than from the right. He loses at least half an ounce of fluid in an hour. He has constantly to apply his pocket-handkerchief when he is out of doors; indoors he feels much less annoyance, and at night notices no discharge.

Right eye: H. being corrected, V. = $\frac{9}{16}$; colour perception normal; field much contracted all round; optic disc pale and atrophic.

Left eye: V. = fingers to outer side; field much contracted all round; optic disc shows well marked atrophy.

* Read at the Meeting of the British Medical Association in Dublin, August, 1887.

Dr. MacMunn, of Wolverhampton, kindly examined the fluid for me ; the following is his report :—

The fluid closely resembles in its character that sent me by Mr. Priestley Smith in 1883 (*Ophth. Rev.*, Vol. II., p. 9). Reaction alkaline ; S.G. 1,035. It failed to reduce Fehling's solution, although when boiled with this the solution became violet owing to the presence of proteid ; with heat alone it became cloudy, and when acetic acid was added after boiling the precipitate became flocculent. It was slightly precipitated by ether and by absolute alcohol ; it contained chlorides in abundance, and traces of sulphates ; it showed the band of serolutein well before the spectroscope.

My friend, Mr. John Priestley, also examined the fluid and sent me a report agreeing in every point with Dr. MacMunn's.

So far as I have been able to ascertain, seven previous cases of a similar nature have been reported, viz., one by Elliotson (*Med. Times and Gaz.*, 1857), one by Baxter (*Brain*, 1882), one by Paget (*Trans. Clinical Soc.*, 1878), one by Nettleship (*Ophth. Rev.*, 1883) ; two by Priestley Smith (*Ophth. Rev.*, 1883), one by Leber (abstracted in *Ophth. Rev.*, 1883). The fact that so few cases have been recorded shows the rarity of the condition, and the importance of a careful investigation and record of each case that may be observed.

Leber, whose case is the last put on record before my own, analyses those previously published, and comes to the conclusion that the fluid is cerebro-spinal, and probably the product of a vascular organ, specially adapted for secreting, as the choroid plexus of the ventricles. He points out that in the majority of cases the S. G. was 1,007 to 1,008, thus corresponding with that of the cerebral fluid. In my case, however, so far as Dr. MacMunn could ascertain from the small quantity sent to him, it was 1,035.

Polypi were detected in two only out of the eight cases.

Brain symptoms were present to some extent in six cases out of the eight ; and in some a distinct connection could be traced between the headaches, giddiness, etc., and the stoppage of fluid.

Atrophy of the optic disc was present in all the cases that were examined ; in several instances it followed optic neuritis. In my case the atrophy does not seem to have followed neuritis. It has been developed very slowly, and, although complete in the right eye, it only makes slow progress in the left.

In noting the details of the cases, I have been struck with the curious coincidence that the optic nerve which is most atrophic, is always on the same side as the most copious discharge.

The clinical evidence in my case does not particularly point to a cerebral origin ; but it is difficult to account for so profuse a discharge from nasal cavities which appear to be normal.

In the discussion which followed the reading of this paper, Dr. Edward Meyer mentioned a case which he had seen with Von Graefe, in which there was neuro-retinitis with nasal discharge and headache. Also a case recently met with in his own practice, in which there was a nasal discharge for a time, and when the discharge stopped cerebral symptoms were developed ; there was progressive atrophy of the optic nerves without neuritis ; vision was still good enough for the rough work of a porter.

Mr. Nettleship mentioned a case in which the patient, a girl, improved in health after the discharge stopped.

Mr. Benson mentioned a case in which there was dropping of fluid from the nostril without eye-symptoms.

Mr. Priestley Smith said that in his first publication on the subject he had adopted the opinion of previous observers, that the fluid was not cerebro-spinal, on the

ground that post-mortem examination in two cases had revealed no abnormal aperture in the base of the skull. Leber's analysis had shown, however, that naked-eye examination as to this point was insufficient, and that there was very strong reason for supposing the fluid to be cerebro-spinal.

W. UHTHOFF (Berlin). Chronic Alcoholism in its Effects upon the Human Eye. *Von Graefe's Archiv* XXXII. 4, p. 95, and XXXIII. 1, p. 257.

The first part of this paper deals with the pathological changes produced by chronic alcoholism in the optic nerve, as demonstrated by seven *post-mortems*, and with the ophthalmoscopic appearances in 1,000 cases of alcoholism observed in two large asylums. The second part treats of alcoholic amblyopia, and its relation to toxic amblyopia in general and idiopathic retro-bulbar neuritis.

The cases which afforded autopsies were the following :—

(1) A male, aged 34, after several attacks of delirium tremens and severe general symptoms of chronic alcoholism, eventually died of the effects of the poison. During life a marked blanching of the temporal halves of the papillæ was observed, and the patient complained of typical visual troubles (fog, haze, etc.). The visual acuity had improved somewhat during the last months of life. There was no history of any considerable use or abuse of tobacco. The microscope revealed degeneration of the whole outer half of the optic nerve, of a conical form, the apex of the cone pointing towards the central vessels; 6 or 7 mm. behind the globe this atrophic area became half-moon shaped; 7 or 8 mm. further back it was an oval, with its long axis vertical, and it gradually shifted more towards the axis of the nerve, till in the canalis opticus it lay nearly centrally. It could be traced up the intra-cranial portion of the nerve and through the chiasma to the optic tract. The lesion was a symmetrical one in the two nerves. Pathologically the disease was an interstitial neuritis, quite distinct from the appearances seen

in simple grey atrophy. The inflammatory changes were found in the whole orbital portion of the nerve, somewhat less intense as they were traced backwards, but becoming more marked again in the *canalis opticus*; from this point backwards they assumed more and more the characteristics of simple degeneration.

(2) A male, aged 61, died of pneumonia during an attack of delirium tremens. He had been for many years an immoderate drinker, but was not known to have been a smoker. Some fourteen years previously his sight had failed, and, though it improved somewhat, it never quite recovered. There was a large central absolute colour scotoma in each visual field, and, ophthalmoscopically, atrophic discolouration of the temporal halves of the papillæ. The microscope showed almost precisely similar changes to those in Case 1.

(3) A male, aged 44, a heavy drinker, suffered from delirium tremens, succeeded by dementia paranoica, and died a lunatic. It was not possible to test the visual fields, but the papillæ exhibited the typical atrophy of their temporal halves. The changes observed microscopically were similar to those seen in the other cases, but much less intense.

(4) A man, aged 29, a heavy drinker, died of meningitis during an attack of delirium tremens. No visual tests possible. Temporal halves of papillæ atrophic-looking, on ophthalmoscopic examination. Microscopic changes similar to those in Case 3, but somewhat more intense.

(5) A man, aged 35, a confirmed drinker, admitted for delirium tremens, had, some fourteen years previously, suffered from "blindness" of five or six weeks' duration. Visual acuity diminished, temporal halves of papillæ atrophic-looking, and in the right eye the nasal side as well. No demonstrable colour scotoma. Pupillary light reflex absent, but contraction with convergence. Died phthisical, with chronic arachnitis, pleuritis, and interstitial hepatitis. Microscopically the optic tracts, the chiasma, and the nerves were

normal, except immediately behind the globes, where an interstitial neuritis was found, as in the other four cases.

(6) A man, aged 48, after repeated attacks of delirium tremens, died of œdema of the lungs, supervening on general paralysis of the insane. Ophthalmoscopically the temporal halves of the papillæ were atrophic, the nasal halves dull and slightly hazy. Six months after this note the left papilla appeared almost normal. No defect in visual fields. Microscopical changes analogous to those in the former cases were found in the optic nerves, but on the right side they disappeared entirely before the nerve left the orbit, and on the left side they did not extend even as far back as the entrance of the central artery.

Case 7, one of tabes, was reported at the Heidelberg Congress in 1884 (vide *O. R.*, Vol. III., p. 312).

The pathological changes found in these optic nerves were quite distinct from those seen in simple grey atrophy as it occurs in tabes and in progressive paralysis. In the latter the connective tissue of the nerve is not thickened, at least in the earlier stages, and its network appears unaltered except for an atrophy of its finest twigs. In alcoholic neuritis there is thickening and proliferation visible even in these finest twigs. In the later stages of grey atrophy the larger connective tissue bundles are often thickened, but the original structure of the opticus is always visible; it never goes on to complete obliteration of the network, and absolute disappearance of the nerve substance, as it does in alcoholic neuritis. In simple grey atrophy again, when it affects only a portion of the nerve, Uhthoff has observed that normal nerve fibres are never found in the diseased area, while they are frequently seen in the midst of the atrophic region in alcoholic neuritis.

There was no evidence of syphilis or renal disease in any of the cases examined. An obvious criticism upon these statistics is that the action of tobacco was not certainly excluded in any one of the patients, but the vast extent of nervous lesions (general paralysis, etc.) produced by alcoholism render it probable that the changes in the optic

nerves were due to the same poison which had attacked so many other portions of the nervous system.

Tables are given of the ophthalmoscopic and ocular abnormalities found in 1,000 patients suffering from severe alcoholism in two large asylums :—

Pathological whiteness of the temporal halves of papillæ, of which 60 suffered at some time from amblyopia	139
Toxic amblyopia (past or present) without ophthalmoscopic signs	9
Haziness of papillæ, and in part of the retinae also	53
Hyperæmia of the papillæ	6
Retinal hæmorrhages (in six cases the results of epilepsy)	7
Pupillary abnormalities	60
(Viz.—Inequalities in size of pupils	25
Loss of re-action to light	10
Very faint re-action to light	25
Re-action in convergence was almost always present.)	
Anomalies of the ocular muscles	22
(Viz.—Paralysis, 3 ; nystagmus, 2 ; and nystagmus-like twitchings on extensive excursions of the globes, 13 ; xerosis conjunctivæ without night-blindness, 4.)	
Various congenital anomalies	29
Chance complications : Cataract, 15 ; nebule, 27 ; phthisis bulbi, 4 ; choroiditis, 7 ; amotio retinæ, 2 ; high myopia, 14 ; amaurosis partialis fugax, 1 ; partial narrowing of retinal artery, 2 ; strabismus, 8.	

From these figures it appears that atrophy of the temporal halves of the papillæ is the most important of the ocular phenomena observed in chronic alcoholism. It was seen in 13.9 per cent. of the cases. Uthoff found a similar condition in only one out of a hundred apparently healthy middle-aged men whom he examined for comparison, and also in about one per cent. of 1,000 lunatics not known to have been addicted to alcohol. Among 400 female lunatics he found it only five times, and of these four were cases of chronic alcoholism, and the fifth one of progressive paralysis, who was also given to drinking.

Ophthalmoscopic appearances seen in 100 cases of toxic amblyopia (Schœler's Clinique) :—

Atrophic appearance of temporal halves of papillæ ...	63
(Of which 57 had the nasal halves normal, and 6 had haze of the nasal side, in one case amounting to distinct neuritis.)	
Distinct haze of the papilla (without visible atrophy) .	8
Retinal hæmorrhages	1
Ophthalmoscopically normal	28

The first group of 63 consisted almost entirely of cases in which defect of vision had existed for a considerable time, in only two for less than six weeks. The second group of eight were of relatively recent amblyopia, in two only longer than two months ; and the twenty-eight ophthalmoscopically normal cases were also mostly recent cases—in only six of them had the amblyopia lasted over three months. As the pathological changes are retrobulbar, it is not surprising that amblyopia can exist for a considerable time without ophthalmoscopic signs. Uthoff believes the neuritis begins, commonly, immediately behind the globe, but it is not improbable that it may sometimes start at the optic foramen, as Samelsohn and Vossius suppose, and it is conceivable that the inflammation may subside before the degenerative process has actually reached the papillæ.

A table is given of 204 cases of retrobulbar neuritis (including the toxic amblyopia cases) seen at Schœler's clinique among 30,000 patients. This affection was seen in 0·68 per cent. of the cases, while diseases of the retina and nerve in general occurred in about 2·5 per cent. :—

1.						No.
Cause.						
Alcohol ... ..	...	...	...	...	...	64
Alcohol and tobacco ... ..	...	...	...	...	...	45
Tobacco... ..	...	...	...	...	...	23
Diabetes ... ..	...	...	...	...	...	3
Lead ... ..	...	...	...	...	...	1
Bisulphide of carbon ... ..	...	...	...	...	...	2
(Schwefelkohlenstoff.)						
Total						138

II.					No.
Cause.					
Syphilis	...	...	...	...	7—4 women.
Heredity	...	...	...	...	7—3 women.
Multiple sclerosis	...	...	...	...	5—all men.
Severe chill	...	...	...	...	4—all men.
Menstrual derangements	...	...	...	...	3
Pregnancy	...	...	...	...	4
Hæmorrhage, in abortion	...	...	...	...	2
Heart affection	...	...	...	...	1
Periostitis of orbit	...	...	...	...	1
Cause not determined	...	...	...	...	32
Total ...					66

Table I. includes only toxic cases, and in these the disease was always bilateral ; the patients were all men.

Table II. includes all other cases ; 38 were males, 28 females. The affection was one-sided in 19 of the 66 cases (9 men, 10 women).

It is seen that alcohol is the most frequent cause of toxic amblyopia, in Berlin at least, its frequency being to that of tobacco as 64 to 23. Uhthoff, however, classed the cases as alcoholic when there was evidence that alcohol was taken in excess, while tobacco was only used in moderation. If drink were taken in moderation and tobacco in excess he classed the case as tobacco amblyopia. The forty-five cases put down as due to both toxic agents combined, were cases in which he could not decide which had most influence for harm. He decidedly rejects the theory that the combination of alcohol with tobacco tends to act as an antidote to the effect of the latter poison.

A number of supposed toxic agents do not appear in these statistics at all, such as quinine, iodoform, salicylic acid, salicylate of soda, bromide of potash, mercury, morphia, nitrate of silver, carbolic acid. Of all these substances quinine is the only one whose action on the sight Uhthoff considers to be certainly demonstrated, and its action, as is well known, differs markedly from that of tobacco and alcohol.

In sixty-six cases no toxic agent was present to account for the retrobulbar neuritis—*i.e.*, in nearly one-third of the

whole number—and it is remarkable that in nearly one-half of these cases (32) no cause whatsoever was discovered for the amblyopia.

Uthoff corroborates the current opinion as to the constant presence of a central scotoma in toxic amblyopia in general. In most of his cases it appeared as a relative scotoma for red and green. In eighteen cases the field for green was lost altogether, or the scotoma extended in some meridians to the periphery. In eighteen cases also a small central scotoma was present for blue. In four cases there were small absolute scotomata in the centre of larger relative scotomata, where small white objects were absolutely invisible. The form of the scotoma was usually that typical of toxic amblyopia, viz., an ellipse with its long axis horizontal and extending more outwards than inwards from the fixation point. Pericentral scotomata were seen eleven times; in one case a pericentral scotoma was present on one side and a paracentral relative colour scotoma for red and green on the opposite. Paracentral scotomata, with the defect just reaching the fixation point, were seen nine times. Recovery generally took place by a gradual decrease of the scotoma centripetally, but occasionally the fixation point was the first to clear.

Uthoff sums up the clinical notes of toxic amblyopia as follows:—Relative central scotomata for red and green is the most frequent sign; occasionally complete or partial peripheral defects for the same colours are present, and in rare cases there are very small central scotomata for blue, and quite exceptionally small absolute central scotomata, surrounded by a blue-blind zone, and more peripherally by a red-green blind region, the periphery for white being normal. These were the common defects of the visual fields. Absolute blindness was never present, and visual acuity was never less than $\frac{6}{60}$.

In the non-toxic cases of retrobulbar neuritis, on the other hand, such bilateral relative central scotomata were only seen ten times out of sixty-six cases. In twenty-four of these sixty-six cases there were bilateral large absolute central scotomata, with or without a surrounding zone of relative blindness—a visual field, such as Uthoff has only seen three times in 138 cases of toxic amblyopia. In eighteen cases

there were central scotomata for colour (or absolute), with relatively normal peripheral fields, but only unilateral—a condition never observed in toxic amblyopia. In ten other cases the fields possessed only peripheral zonal areas, and the vision was commonly below $\frac{6}{200}$. In twenty-seven cases the blindness was only one-sided, and in others a considerable time elapsed between the affection of the first and that of the second eye. The blindness was more frequently sudden in its onset than in toxic amblyopia. The ages and sexes commonly affected in the toxic and the non-toxic forms of retrobulbar neuritis are different, so that Uhthoff feels himself justified, on the whole, in the conclusion that, from a clinical standpoint toxic amblyopia and non-toxic retrobulbar neuritis are distinct entities, although the pathological changes in the nerves underlying the symptoms may be indistinguishable.

J. B. S.

SACHS (Innsbruck). On Central Scotoma in Diseases of the Optic Nerve. *Archiv für Augenheilk.* 1887. Band XVIII., Heft I., p. 21.

After referring to the observations of Samelsohn and Nettleship, which made clear the pathological anatomy of optic nerve diseases characterised by central scotomata, Sachs proceeds to discuss the theory first propounded by Schön and again recently by Bär, that central scotoma in toxic amblyopia is really a retinal affection. Schön held that the disease consisted in a functional exhaustion of the nervous elements in the region of the macula, an exhaustion to which this part of the retina, he believed, was predisposed from its sensibility to light due to its physiological peculiarities. This exhaustion might, he held, proceed to an ascending atrophy recognisable by the pallor of the temporal part of the disc. Bär has recently attributed toxic amblyopia to vascular spasm induced by nicotine, this spasm acting on the macular region more powerfully than elsewhere owing to the peculiarity of its vascular supply. Sachs points out that, according to Schön's explanation, the scotoma ought

to be symmetrical about the fixation point, whereas it invariably extends more to the temporal side of the field; that also, steady recovery of vision, with persistent pallor of the temporal portion of the disc, would be an impossibility, were there in reality an ascending atrophy, and yet undoubtedly such cases occur. To Bir's theory of vascular spasm he answers, first, that it has never been observed; and second, he holds that a case which he has observed proves that even where there is but transient affection of vision, with relative scotoma, there is already a partial degeneration of the optic nerve, disproving, as he holds, the theory of ascending degeneration.

A labourer, aged 45 years, admitting abuse of tobacco and evidently a drunkard, was taken into hospital June, 1884, complaining of loss of vision since a few days. The temporal portions of the discs showed a grey greenish pallor, the fundi were otherwise normal.

V.	R. & L. $\frac{6}{18}$, $\frac{6}{12}$ partly, and J. 3, c. + 1.5 D.	
	75 50 50	55 50 65
Fields	L. 90 + 50	R. 55 + 85
	85 70 60	60 70 85

The scotomata for red and green had the following dimensions:—

	8 5 5	4 5 12
Red	L. 18 + 15	R. 5 + 19
	12 10 5	5 4 10
	10 5 5	4
Green	L. 20 + 8	R. 5 + 20
	12 8 5	5

Blue and yellow were retained, but were "less pretty." Under abstinence and potass. iodid. the amblyopia rapidly improved, and six days after admission V. R. $\frac{6}{6}$ nearly, L. $\frac{6}{9}$ partly; R. J. 1 at 18 cm., L. J. 1 not so well.

The patient was discharged ten days after admission, V. $\frac{6}{6}$ nearly, scotomata of same dimensions as before, but not so complete. In August, 1884, the patient was attacked with

acute nephritis, and died nine days afterwards from pneumonia. Before his death he said he saw now "quite well."

Transverse sections of the optic nerves showed, both macroscopically and microscopically, an area of degeneration. This area varied both in shape and in position in the various sections. In the papilla it formed a sector, at the truncated apex of which lay the central vessels, while the base lay at the lateral periphery of the nerve; and the sides, enclosing an angle of 70° , were bent outwards at the base. It occupied somewhat less than a fourth of the whole area of the section. Immediately behind the papilla the area began to alter in shape, remaining triangular, but with a broader base and a more obtuse angle at the apex, the central vessels still occupying the apex, but being placed more downward and outward in the nerve. Gradually, as the sections got further from the eyeball, healthy fibres began to intervene between the central vessels and the degenerated area on the one hand, and between the degenerated area and the periphery of the nerve on the other. At the point of entry of the central vessels the degenerated area was still in relation with the periphery, but some distance in front of the optic canal (or, as we less correctly name it, optic foramen) the atrophic area ceased to be in relation with the sheath, and now formed a crescentic area, concave to the axis of the nerve, lying in the lower and outer quadrant of the section. The nerve was flattened on the side of the atrophic area, and the subarachnoid space widened there. The degree of atrophy was at maximum in the middle of the optic canal, where many bundles had almost entirely disappeared, the septa nearly touching each other. All along the tract the degree of atrophy was greater near the middle of the degenerated area than at its periphery. The change consisted in partial disappearance of nerve fibres and development of neuroglia-like tissue, which stained imperfectly and was very translucent. At points the nerve fibres were replaced by granular material, and the trabeculae were irregularly twisted. Even at the culminating point of the degeneration, however, there was only relative increase of nuclei, with no accumulation of lymphoid cells, or granule cells, or corpora amylacea. From the middle of the optic

canal back to the chiasma the degeneration became less marked. *Post-mortem* changes prevented the condition of the chiasma and tracts from being ascertained. Although thus the canalicular part of the nerve was the point of maximum intensity, and presumably the point of commencement, of the atrophy, there was no progressive increase of the process passing forward from this point. The change was of practically equal intensity throughout the orbital part of the nerve. As to the retina, Sachs states that he could be sure there was no atrophy of the ganglion cells in the neighbourhood of the macula; but whether there was thinning of the nerve fibre layer he could not decide.

As to the pathology of the change, he does not commit himself; for although he found in his case no evidence of an acute inflammatory process, this has been recorded by others, and he notes that in his case the acute period had passed. He mentions also that in various cases there have been recorded blurring of the margins of the disc, radial streaking of the nerve fibre layer, enlargement of the small vessels of the papilla and neighbourhood and of the retinal veins—changes pointing to neuritis. He discusses the selective affinity of lead and alcohol for the peripheral nerves, and refers to alcohol and nicotin as the toxic agents that produce central scotoma, but does not attempt to eliminate the effects of each of these. He records a case of central scotoma in diabetes mellitus, but does not state the habits of the patient as to tobacco and alcohol. Nettleship's classical case of central scotoma with diabetes (*Ophth. Soc. Trans.*, vol. I, p. 124) was a large smoker.

Sachs emphasises the fact demonstrated by Bunge and himself, that the degenerated fibres do not occupy the centre of the nerve in the optic canal, as Samelsohn believed and held to be the explanation of the localized degeneration. They lie quite eccentric down and out. Also the entrance of the central vessels—which, by the way, in his case, was in the lower and inner quadrant on both sides—seems to have no effect on the degeneration. The fibres affected supply the papillo-macular area, an ovoid area corresponding to the ovoid scotoma whose blunt end lies to the nasal side,

and whose apex is occupied by the blind spot. The average size of the scotoma he finds to be ext. $18^{\circ} + 7^{\circ}$ int., and 6°

the fibres most severely affected do not supply the macular, but a part of the papillo-macular region lying between the papilla and macula. This fact, he holds, gives an explanation of how, with evidently progressive pallor of the temporal side of the papilla, there may yet be steady improvement of vision in cases where abstinence from the toxic agent is enforced. The affection of central vision may be a mere temporary extension to the true macular fibres of vascular conditions which have produced permanent changes in the centre of the degenerated tract.

He records six other carefully-observed cases of central scotoma, or, as he would term it, papillo-macular scotoma, and the results go strongly to justify his conclusion as to the paracentral instead of central commencement of the scotoma—viz., at a point about 5° from the fixation point. The improvement of the scotoma, he believes, begins from the nasal side of the field, and when the improvement has advanced to the vertical through the fixation point, it gives the form of scotoma called by Samelsohn hemianopic. The last part to recover is, he finds, the paracentral point above defined.

J. A.

Th. TREITEL (Königsberg). Positive Central Scotoma. The cause of Visual Defect in Disease of Retina. *Von Graefe's Archiv XXXI. 1, p. 259.*

This paper contains additional matter in support of Treitel's views on night-blindness, but is also important as offering the first really intelligible explanation that has appeared of the difference between positive and negative scotomata.

The negative, as is known, are common in diseases of the optic nerve, the positive in those of the retina itself. Förster,

the classical authority on this subject, attributed positive scotomata to a dulness of the light-sense ; that is, according to his views, synonymous with night-blindness.

Treitel advances the following arguments against the "night-blind" theory of positive scotomata:—

1. The scotomata are visible in bright daylight, not merely for a moment or two, but permanently.

2. The patient sees the scotoma not as a black, but as a grey spot, more or less dark, according to the stage of the disease. Förster, on the contrary, assumes that sensation is absent in the diseased part of the retina, and therefore we should expect the spot to appear quite black.

3. Colour-vision in the region of a positive scotoma does not exhibit the defects that are found in the night-blind.

4. Positive scotomata are found in cases which have nothing in common with symptomatic night-blindness, *e.g.*, hæmorrhagic retinitis.

Treitel regards a positive scotoma as a purely entoptical phenomenon : the patient sees the shadow of his diseased retina. There is evidence ophthalmoscopical and pathological of loss of retinal transparency in those diseases which are accompanied by positive scotomata ; these scotomata are best seen just in those conditions under which *muscæ volitantes* are most distinct ; and lastly, parallactic movements can be demonstrated in the shadow (the scotoma).

Treitel found that the positive scotoma is most distinct in bright illumination ; so are *muscæ volitantes*. In both cases the intensity of the "shadow" is variable, objects can be seen through it, and the distinctness of the shadow diminishes with diminishing light. This last phenomenon depends upon the fact that the eye perceives differences of illumination best in daylight. Another point in favour of Treitel's theory is that patients can perceive relatively dark scotomata in diminished light, while less dark ones have quite disappeared.

The unequal darkness in scotomata, and the occurrence of bright spots in them, is easily explained on Treitel's theory by the unequal opacity of the retina, and the colour of the scotoma is often explicable by the colour of the retinal exudation of which it is the shadow.

With regard to colour-vision, Treitel found that most patients perceived colours as if veiled in the region of a scotoma, but could recognise the colour present. In seven cases the colour scotoma was absolute. A third group, however, exhibited peculiar defects of colour-vision, consisting in either a confusion between green and blue, or in an absolute blindness for all colours except red.

The defects in colour-vision are, then, first a mere darkening of the colour as if a veil were over it; secondly, blue seen as green, and green as either green or grey, while red is correctly seen; thirdly, blue and green both grey, red still correct; and, lastly, absolute colour-blindness, pigments merely distinguishable by their relative brightness, green and yellow appearing bright, and red and blue dark.

These anomalies of colour-vision are easily explained by the assumption of a shadow thrown by the diseased retina on its bacillary layer, producing the same colour lesions as diminished light does in the normal eye. Aubert has described the latter as follows: in lowest illumination colour-vision absent, colours differentiated merely by their luminosity; then, as the illumination increases, first red becomes recognisable, then green and blue; bright green and bright blue require most light to be distinguished.

For night-blindness there is but one absolutely pathognomonic symptom, viz., the peculiar qualitative anomaly of colour-vision as described by Förster. Now this, in Treitel's experience, is never found in cases of positive scotoma.

In negative scotomata (as commonly seen in diseases of the optic nerve) colour-vision exhibits also peculiar defects. Of the three colours green, red, blue, sensation for green goes first, then that for red, and lastly, that for blue.

J. B. S.

THOMSEN (Berlin). On the Pathology and Pathological Anatomy of Acute Complete (Alcoholic) Paralysis of Ocular Muscles. (*Polio-encephalitis Acuta superior*. — Wernicke.) *Archiv für Psychiatric*, Bd. XLX., Heft 1, p. 185.

KOJEWNIKOFF (Moscow). Nuclear Ophthalmoplegia. *Progrès Médical*, Tome VI., Nos. 36 and 37, 1887.

Under the heading "Acute Hæmorrhagic Polio-encephalitis Superior," Wernicke, in his "Lehrbuch d. Gehirnkrankheiten," Bd. II. 229, describes a rare form of illness, the anatomical basis of which appears to be a primary acute disease in the neighbourhood of the nuclei of the oculomotor nerves, and which runs a fatal course in ten to fourteen days. The symptoms, taken generally, consist of affection of the ocular muscles developing rapidly to almost complete paralysis; a staggering gait, sometimes ataxic, and mental disturbance, somewhat similar to that of delirium tremens.

Wernicke had seen three cases, and quotes one by Gayet, these four comprising all the recorded cases up to that date.* Thomsen now reports two additional cases, and Kojewnikoff one, each with post-mortem examination.

Thomsen's first case occurred in a man æt. 45, admitted Dec. 15th, 1886, whose history, obtained from his wife, was briefly as follows:—He had suffered from rheumatism since 1870. Had been a very heavy drinker, and in June, 1885, had been dismissed from his employment for drunkenness. No history of syphilis. Had never suffered from delirium; no fits, no paralysis, no loss of memory. In the summer of 1886 he complained of dimness of sight; was unable to read, and could not tell the time by a watch. No squint. In four or five weeks he improved. On December 11th, 1886, he com-

* A few other cases have been recorded as "Acute Nuclear Paralysis," but the patients recovered, and the nature of the lesion was doubtful. Sturge, *Trans. Oph. Soc.*, Vol. I.; Elter, *Cor. Bl. f. Schweizer Aerzte*, 1882; Möbius, *Centralbl. f. Nervenheilk.*, 1882.

plained again of failure of sight ; on the 13th he saw double, on the 15th, hallucinations of sight. When admitted to hospital the patient was unruly, and would not stay in bed ; this condition soon gave place to a low, quiet delirium. Alcoholic redness of face ; tongue tremulous ; speech thick. Abdominal and thoracic viscera apparently healthy. No paralysis, but some tremor, especially of upper extremities. Knee reflexes brisk ; sensibility little, if at all, altered. Temperature 38° , never higher, but twice sank to 34.8° ; the morning generally higher than the evening temperature. Urine free from albumen.

Eyes.—Complete paralysis of internal and external recti. Upward and downward movement very limited. Slight nystagmus. No ptosis. Pupils equal, moderately dilated, re-act to light, though badly. V. could not be noted, but diplopia was present. *Ophthalm.* : R.E., pallor of temporal half of disc ; L.E., normal.

No material change occurred, and patient died on 23rd December, eight days after admission.

Post-mortem Examination, Dec. 24th.—*Heart*, brown atrophy. *Lungs*, pale. *Liver*, fatty. *Kidneys* showed numerous small scars. *Spleen*, small. *Head* : *D.M.* soft ; *Pia* thickened and œdematous. *Brain* of good consistence, cortex pale, medullary layer slightly œdematous. No localised disease. The medulla oblongata and spinal cord were hardened uncut, and examined with other parts of the brain microscopically. The spinal cord showed only a few small extravasations in the pia mater of the lumbar region. The med. oblong. showed similar hæmorrhages. The basal pia mater and vessels healthy. The cells of the nuclei of the hypoglossus, vagus, auditory fasciculus, trigeminus, abducens, trochlearis, and oculo-motorius were all normal in appearance, and the root fibres of all the cranial nerves showed no change. There were, however, marked vascular changes, consisting of hyperæmia and multiple hæmorrhages, varying greatly in size, many microscopic, others easily visible to the naked eye. They were most numerous in the grey matter of the floor of the fourth ventricle and aqueduct of Sylvius, and isolated in the white substance of the medulla and pons. They were generally recent, and

either free in the tissue or confined to the perivascular space ; in a few places small aneurismal dilatations of the vessel walls were seen, but as a rule there was no evident change. The trunks of the third, fourth, and sixth, and one crural nerve which were examined, were normal. The optic nerves exhibited partial interstitial inflammation, symmetrical, and in all respects similar to the changes described by Uhthoff (*see* p. 102).

Case 2.—A male, æt. 47, admitted for "Chronic Alcoholism," October 13th, 1886. This case in its clinical aspects was almost a counterpart of Case 1, and death occurred sixteen days after admission. There was a history of alcoholic excess, and an attack of D.T. four years previously. Some doubtful evidence of syphilis. The ocular symptoms were similar to those in Case 1, but the paralysis was more complete and there was an absence of nystagmus till a few days before death. No ophthalmoscopic changes.

Post-mortem Examination.—General muscular atrophy and atheroma of arteries ; interstitial nephritis. Head : calvaria thick and dense ; D.M. flaccid. Pia, œdematous. *Brain*, very pale, ventricles rather large.

Microscopical Examination.—The vessels of the spinal cord were congested, but there were no extravasations save in the pia mater in the dorsal region. No changes in the nerve tissue.

In the nuclei of the hypoglossus, auditory fasciculus abducens, oculo-motorius, trochlearis, and doubtfully the vagus, were well marked signs of degeneration of the ganglion cells, and, in addition, numerous small extravasations, while the nuclei of the facial and trigeminal nerves were free from degeneration, though there were hæmorrhages in and about them. All the nerve trunks appeared healthy.

The left external rectus muscle showed some parenchymatous degeneration, and similar but less marked change was observed in the superior rectus.

Kojewnikoff's case was a man, æt. 41, who had been a heavy drinker of spirits for many years, and when admitted

to hospital had delirium, with excitement, hallucinations of sight, and almost complete paralysis of external ocular muscles, including the levatores palpebrarum. These symptoms came on acutely seven days before admission, and patient died on the ninth day of his illness. Satisfactory examination while in hospital was very difficult, but it was ascertained that there was no paralysis, except that of ocular muscles. The eyes deviated upwards and outwards, and movement in all directions was almost completely lost. Pupils re-acted to light. Ophthalmoscopic examination impossible. At the autopsy (twenty-four hours after death) the following conditions were found : Œdema of *lungs*, fatty degeneration of *liver* ; *heart* flabby ; some atheromatous change in heart and large vessels. *Calvaria* normal ; *pia mater* of brain œdematous. *Lateral ventricles* dilated ; *ependyma* thickened and granular. When the optic thalami were cut across near their middle, a grey band, sprinkled with small red points, could be seen towards their median borders. The ependyma of the fourth ventricle was thick and granular, but there were no other naked eye changes in the brain or spinal cord. Microscopic examination, however, revealed numerous extravasations extending over a wide area. In the optic thalami these hæmorrhages were situated along the median border, and were exactly symmetrical on the two sides. They were present in the walls of the aqueduct, in the posterior commissure, and in the floor of the fourth ventricle, immediately beneath the ependyma, but confined to the anterior part. Here there was also some softening. The nucleus of the oculo-motorius was degenerated and contained hæmorrhages, but these changes stopped short of the nuclei of the abducens. The facial nucleus was also intact. The condition of the nuclei of the fourth pair is not mentioned. There were no peripheral changes in the cranial nerves.

The careful clinical and pathological records of the above three cases enhance the value and interest attaching to them, as instances of a disease but rarely met with. They very closely resemble the account given by Wernicke of his cases, though, on comparison, a few points of difference are noticeable. In Thomsen's and Kojewnikoff's patients there

was a definite history of alcoholic excesses ; this also obtained in two of Wernicke's three patients; in the third, poisoning by sulphuric acid was given as the cause. Grouping the five alcoholic cases, it may be noted that the levatores palpebrarum muscles were paralysed in only two, viz., Wernicke's first case and Kojewnikoff's case, while all the extra-ocular muscles proper were affected. The intra-ocular muscles were unaffected in all (as far as could be determined), but in Wernicke's first case there was marked myosis.

Wernicke's third case, that occurring after poisoning by sulphuric acid, must in some respects be placed in a separate category. There were, in addition to the symptoms of nuclear disease, evidences of multiple neuritis, and this will perhaps explain the fact that the ocular symptoms began by bilateral paralysis of the sixth nerves ; whereas Wernicke states that in this class of cases the ocular paralysis is first evident in associated muscles.

The term "*Polio-encephalitis superior*" is used by Wernicke for an affection of the nerve nuclei from the third ventricle to that of the abduccus ; similar disease of the nuclei below this, in the lower part of the floor of fourth ventricle, has been called "*Polio-encephalitis inferior*." The name has been objected to, as inaccurate, by Gowers (*Diseases of the Nervous System*," Vol. II., p. 182), who considers that it should be restricted to inflammation of the cortex, and should not come into use for lesions situated on a lower level.

J. B. L.

EVETSKY (Moscow.) Post-diphtheritic Ophthalmoplegia Externa. *Arch. d'Ophthalmologie*, Nov.—Dec., 1887.

Paralysis of the ciliary muscle is a not infrequent sequel of diphtheria, but paralysis of one or more of the external ocular muscles is rarely met with. Alfred Graefe* noted that he had seen only two cases, one in which the superior

* Graefe-Saemisch VI., p. 73.

oblique, and another in which the external recti suffered. Remak has published* statistics of 100 cases of post-diphtheritic cycloplegia occurring in Hirschberg's clinique, and of these ten had paralysis of one or both external recti. In ten similar cases observed by Rosenmeyer† paresis of both external recti muscles occurred in two.

Still more rarely all the external ocular muscles are paralysed, and Evetsky, in publishing his case, refers to the only two recorded cases he has found. (*v. Ophth. Rev.*, Vol. IV., p. 170, Vol. V., p. 217.)

(1) Uhthoff‡ had a patient, a boy aged 10, under his care, who had had diphtheria of the fauces from September 1st to 17th, followed by paralysis of the soft palate and of the ciliary muscle at the end of the month. On the 10th of October the external ocular muscles became affected, and in a few days there was complete immobility of the eyes and ptosis. V. for distance normal; no ophthalmoscopic changes. Later, paresis of lower extremities and loss of patellar reflexes. The paralysis of accommodation and of the external ocular muscles lasted for about one month, and recovery ensued in the order in which the paralysis came on.

(2) Mendel's§ case occurred in a boy aged 8, who had faucial diphtheria from the 22nd to the 28th September, followed by paralysis of the soft palate on October 4th. A month later paresis of upper and lower extremities supervened, and affection of ocular muscles, as follows:—Double ptosis; right eye, paresis of the superior, inferior and external recti; left eye, paresis of all the recti muscles; no loss of accommodation. In addition, there was paralysis of the right facial nerve, and of the muscles in the nape of the neck. Loss of patellar reflexes. Death occurred on the 11th November, with symptoms of pulmonary paralysis. Microscopical examination of the brain revealed "marked hyperemia" in the neighbourhood of the corpora quadrigemina.

* *Centralbl. für prakt. Augenheilk.*, 1886, VI.

† *Wien. Med. Wochenschr.*, 1886, No. 13.

‡ *Neurolog. Centralblatt*, 1885, No. 6.

§ *Ibid.*

mina and decussating pyramids, and numerous scattered extravasations, one of which was in the right sixth nerve, as it passed over the surface of the pons. No changes in the walls of the vessels, nor in the nuclei of the third, sixth, pneumogastric and hypoglossal nerves. In the nerves at the basis cranii there were signs of neuritis—viz., increase in the nuclei of the neurilemma, and changes in the myeline sheaths.

Evetsky's patient was a girl aged 8, and came under his care on November 25th, 1886, with the following symptoms: Complete bilateral ptosis; upward and downward movement of the eyes abolished, lateral movements very limited. No loss of accommodation. V. R. $\frac{15}{30}$, L. $\frac{15}{20}$; refraction Em. Visual fields of normal extent. Colour-sense normal. The child's voice was markedly nasal, and on examination there was complete paralysis of the soft palate, and loss of sensation in the mucous membrane of the fauces. No motor or sensory paralysis elsewhere, and no loss of tendon reflexes.

Two weeks previously the child had had a sore throat, with painful deglutition, but the attack was so slight that she was not confined to bed, and in two days was well again. Drooping of the lids and a nasal intonation were noticed by the parents on November 21st, four days before she came under observation. The father had had syphilis, and the child, who was born at full term, had, when five months old, an ill-defined skin eruption, but no other illness. The condition of the patient steadily improved, and by December 23rd the paralysis of ocular muscles and the other symptoms had entirely disappeared.

Evetsky discusses the possible causes of the ophthalmoplegia in his case, and concludes, and rightly we think, that the throat affection was most probably a mild diphtheria, and that the subsequent symptoms may justly be attributed to it; he fully recognises that, according to Hutchinson, ophthalmoplegia externa may arise in hereditary syphilis, and draws attention to its progressive character in such a case.

The two above-mentioned cases and his own all occurred

in children eight to ten years of age, and in all the throat affection was not very severe. In Uhthoff's and Mendel's cases paralysis of the soft palate came on almost immediately, and was followed three to four weeks later by paralysis of the ocular muscles. In Evetsky's patient the palate and ocular muscles were simultaneously affected. In two of the three cases the intra-ocular muscles escaped, while in one (that of Uhthoff) cycloplegia had existed for two weeks before the external muscles suffered. The order in which these muscles became paralysed is not known in any of the cases; in Uhthoff's the ciliary muscle recovered before the external muscles.

In concluding his paper the author remarks that the lesion in cases of ophthalmoplegia externa is now generally considered to be nuclear; and it would be very difficult to explain otherwise the absence in some cases of any affection of the intra-ocular muscles, the nerves to which run in the trunk of the motor oculi, alongside those of the paralysed muscles. In post-diphtheritic paralysis, however, some authorities attribute the loss of power to a peripheral neuritis, and Mendel's case, in which a *post-mortem* examination was made, favours this view. Here the nuclei of origin of the third nerves were not definitely affected, whilst in the trunks of the nerves there were evident signs of inflammation. The absence of any affection of the ciliary and pupillary muscles in this case, in spite of the neuritis, remains unexplained.

J. B. L.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM

THURSDAY MARCH 8TH, 1888.

J. W. HULKE, F.R.S., President, in the chair.

Reported by JOHN ABERCROMBIE, M.D.

On Retinal Hemorrhage in the Yellow Spot Region. Mr. Lang read the notes of a case of a large macular hemorrhage which had been absorbed, leaving perfect vision. He

remarked that in the cases where vision was restored it was most probable that the hæmorrhage had taken place between the hyaloid membrane of the vitreous and retina, and not, as hitherto believed, between the layers of the retina or in the choroid. In support of this view he drew attention to the red colour that the lights presented to the damaged eye, and also to the folded appearance of a membrane seen in front of the extravasation, which could only be the displaced hyaloid raised by the hæmorrhage. He explained the circular appearance of these hæmorrhages by an anatomical condition noticed by Mr. Marcus Gunn,—namely, that at the macula the hyaloid was not attached to the retina at all, or at any rate not so firmly as it was around the yellow spot region, therefore a hæmorrhage would be likely to be limited in the circular manner so frequently seen.

The President observed that probably the hæmorrhage did not own the same source in all the cases.

Mr. Silcock believed that De Wecker had given a drawing showing that the hæmorrhage was in the choroid. In a case of his own the patient did not find objects red; there was a very small central, absolute scotoma. He inferred that the hæmorrhages were choroidal because they were large, and at a point where there was no large retinal vessel, and, moreover, they generally cleared up entirely.

Mr. Nettleship showed diagrams of two cases of large semicircular hæmorrhage at the yellow spot; the inferior macular artery, which traversed the blood patch, was found to be obliterated in one case, and greatly altered in the other. These cases showed that the vessel which supplied the blood effusion was a retinal one. In some of these cases the blood in the early stage was found extending on to the surface of the optic disc; in some the blood burst forwards into the vitreous some days after the extravasation at the fundus. These facts could be readily explained on Mr. Gunn's and Mr. Lang's hypothesis, but could hardly be explained if the blood came from the choroidal vessels.

Dr. Anderson mentioned a case of retinal hæmorrhage where *post-mortem* it appeared that the bleeding must have taken place between the retina and vitreous.

Mr. Lang explained that it was only in the cases where

complete recovery took place that the hæmorrhage was in front of the retina.

Ciliary Tumours. — Dr. Mules read this paper, only dealing with those of primary ciliary origin, and traversing Knapp's view of their frequency. Detailing the varieties of these growths, after their division into the two great classes of benign and malignant, he referred to the diagnosis as between ciliary tumours and those confined to the iris, and laid stress on an early and accurate diagnosis, to be followed in the case of iritic tumours by the immediate removal of the affected portion of tissue. He pointed to the value of a light beam in cases where the diagnosis was doubtful between early ciliary staphyloma and ciliary tumour, and deprecated the differential diagnosis between intra-ocular tumours and harmless retinal separation by acupuncture, adducing examples of its danger. He further referred to the locality of these growths, and corrected his previous statement that they always arose at the inner quadrant. The mode of development was touched on. The "irido-dialysis" was explained as taking place in three different ways, each interesting, and suggestive of general infection. By the kindness of members, drawings and sections were shown illustrating the paper.

Professor Hirschberg contributed some fine slides of ciliary and other ocular tumours, the author from his own collection bringing forward specimens and drawings of those rare affections.

In reply to the President, Mr. Lawford mentioned that he had lately examined a tumour of the ciliary body, which proved to be a mixed round and spindle-celled sarcoma. The tumour grew from the nasal side.

Mr. Simeon Snell had operated on two cases of sarcoma of the ciliary body in persons advanced in years.

Mr. McHardy mentioned a point of diagnostic value. He had found that where there was a detachment of the retina, with intra-ocular tumour and diminished tension, the tumour had its origin in the ciliary body.

Dr. Mules announced his intention of presenting the series of drawings used in illustration of his paper to the library of the Society.

Sarcoma after Sclerotomy for Glaucoma.—Mr. Simeon Snell (Sheffield) related this case. The patient was a man, aged 42, and sclerotomy was performed on March 27th, 1884, for subacute glaucoma; great pain + T 2, media turbid, cornea steamy-looking, but vision was $\frac{20}{30}$; relief to pain was immediate, vision improved to $\frac{20}{20}$, and tension became normal. He remained well up to the latter end of 1885. The media were clear, and a good view of the interior was obtainable; beyond excavation of the optic disc there was nothing to note. In January, 1886, he came with two small "lumps," one at the site of the puncture, and the other at the counter puncture for sclerotomy. The sclerotomy had been performed with De Wecker's knife, and thus the wound was limited to the puncture and counter puncture, and to the width of the instrument. The pain was relieved and the staphylomata subsided with eserine. He returned to work, but he said that during the whole of this year pain was never really absent. In September, 1886, he came with severe pain, and again eserine did some good. At the end of December, 1886, he was again seen, and then, in addition to the staphylomata at the punctures for sclerotomy, there was another above and between them; tension was decidedly increased. The lens was more opaque, and a view of the interior was not possible. He still saw large letters by turning the eye outwards. Pain was very severe. Puncture of sclerotic was performed December 30th, with temporary relief, and repeated on January 22nd, 1887. The growths were much larger, and were still growing. February 16th, 1887, enucleation of globe; besides the outgrowths in front, there were large nodules on the sclerotic behind. The optic nerve was divided as far back as possible, and suspicious pieces of tissue removed. Growth returned, and on July 10th the orbit was cleared out, and chloride of zinc paste applied. No recurrence. The tumour was a small spindle-celled sarcoma. It filled the eyeball, except a little space below and to the inner side; it had perforated the sclerotic above, midway between the optic nerve and the cornea, and also at the outer side of the optic nerve entrance. Sections of the eyeball, mounted in glycerine jelly were shown.

Mr. Lawford asked if there had been any symptom of glaucoma in the second eye.

The President thought it was very difficult to assign cause and effect in these cases, and remarked that sometimes a sarcoma remained dormant for a very long time.

Mr. Mules thought that the case was one where his small beam of light would have been of diagnostic service.

Mr. Power referred to the danger of chloride of zinc ; he had applied it after clearing out the contents of the orbit in one case, where the patient had much pain afterwards, and died in two days from the artery being attacked by the caustic.

Mr. Nettleship had seen bad results from the use of chloride of zinc to stop hæmorrhage in these cases, and once death, which he attributed to it.

Mr. Snell briefly replied.

Punctured Wound of Upper Eyelid followed by complete Palsy of the Third Nerve and Optic Nerve Atrophy.—Mr. Simeon Snell (Sheffield) related for Mr. W. A. Garrard the case of a boy, aged seven, who on April 10th, 1887, fell while holding a piece of stick, and it pierced the left upper eyelid just above the margin. A boy pulled it out, but there was no reason to think it had pierced deeply. He was admitted to the Rotherham Hospital. The next day the eye was closed ; on the fourth day the eyelid was still drooping and, on raising it, dilatation of pupil, loss of movements of eyeball, and the characteristics of complete palsy of motor oculi were discovered. The optic disc was normal. On May 9th Mr. Snell saw the patient ; the optic disc was a little paler than its fellow ; complete paralysis of third nerve was present ; accommodation was paralysed. A few days later recovery commenced by his being able to raise the eyelid a little, and by June 2nd ptosis had disappeared, and the movements of eyeball were good. When seen in November all affection of motor oculi had disappeared ; the optic papilla was atrophic ; the vessels were not reduced in size ; vision was very imperfect. At no time were the fourth, sixth, or ophthalmic division of fifth involved. In discussing the nature of the lesion in this case, Mr. Snell said that direct injury to the parts at the back of the orbit was excluded, as the stick did not penetrate. Leber had accounted for cases of monocular amaurosis after blows

about the supra-orbital region or head as due to fracture in the vicinity of the optic foramen, and not to interference with the fifth nerve. Holder had pointed out also that in 60 per cent. of cases of fracture of the base, *post-mortem* examination revealed fracture of the wall of the optic foramen. Berlin had stated that Nuhn, in 1845, sought an explanation in an injury or rent of the optic nerve within the optic foramen. It seemed doubtful if the blow on the eye in the case related was sufficient to cause fracture, as Leber suggested, but it might have been enough to have driven the eyeball into the orbit, causing jarring, or compression, of the optic nerve. The question why the third was the only nerve affected was not easy of explanation. The slow onset of the optic nerve atrophy seemed to indicate that the lesion was high up, the degenerative process passing downwards. The almost immediate occurrence of the third nerve palsy suggested effusion, which would allow of recovery ; the completeness of the palsy pointed to the lesion being close up to, or at the trunk of, the motor oculi.

Mr. Nettleship thought that more proof was required that there had not been a penetrating wound of the orbit. The explanation of the case he offered was that there had been such a wound, and he instanced a somewhat similar case where a penetrating wound had passed unnoticed. Some reason was wanted to explain why one nerve would recover and not another ; the optic nerve rarely recovered.

Mr. Edgar Browne took the same view of the case as Mr. Nettleship did, and mentioned a case where ecchymosis was due to an unsuspected piece of pipe stem lodged in the orbit.

Mr. Frost had had a similar experience, and the President mentioned a case in which a fatal tetanus resulted from a foreign body in the orbit.

Dr. Van Millingen had seen ptosis without any other paralysis result from a blow on the orbit.

Mr. Snell, in reply, said that the patient had been seen at once by a very good observer, and that he himself had been unable to detect any mark on the conjunctiva, and he adhered to his belief that there had not been a penetrating

wound ; even if there had been, he could not see that it would explain the paralysis of the whole of the third nerve which had been observed in this case.

Card Specimens.—Mr. J. W. Hulke : Case of Pulsating Tumour of the Orbit with Proptosis.—Dr. Van Millingen : Instruments.—Mr. E. T. Collins : Disease of Choroid (? Colloid).—Mr. Bickerton : Piece of Glass removed from the Anterior Chamber.—Messrs. Critchett and Juler : Case simulating Glaucoma.—Mr. Doyne : New form of Optometer.

RECENT LITERATURE.

A. RETINA. OPTIC NERVE. CENTRES.

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R. L. O. H. Reports, Vol. XII., pt. 1, Jan., 1888.

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C. CORNEA. CONJUNCTIVA. SCLERA.

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CYSTICERCUS OR IRIS-CYST ?

BY KARL GROSSMANN, M.D., OPHTHALMIC SURGEON TO THE
STANLEY HOSPITAL, LIVERPOOL.

The following case, which came under my notice lately, is sufficiently unique to justify its publication.

On January 27th my colleague, Mr. A. Wilson, brought me a young man suffering from severe inflammation of the right eye. I here give the history of the case :—

H. B., 33 years of age, when a boy, suffered from occasional epileptic fits, which were brought on more readily by over-excitement and great bodily exertion. Despite the fact that no treatment was adopted, they gradually disappeared.

About ten years ago his right big toe began to be painful ; swelling set in, and suppuration seems to have followed.

In May, 1887, he had his right toe injured. Although the injury was not a grave one, the toe was very sore and painful, and he came to Mr. Wilson, who decided to amputate the toe. The wound healed well and quickly, so that the patient was discharged from the hospital in nineteen days.

About the end of November, 1887, he was suddenly seized with epilepsy. From that time the attacks came on as frequently as every second day, sometimes as often as twice a day. These attacks were preceded by a feeling of numbness in the left side, especially of the left arm and side of face. It was on account of these fits that he again sought advice. Dr. Wilson accordingly gave him bromide and iodide of potash.

On January 27th, 1888, the right eye was severely inflamed, and the patient was handed over to me. As far as the eyes were concerned, I could only ascertain that the patient had noticed, first about eighteen months ago, something obstructing the sight of the right eye "*like a big whitish spot,*" which had gradually increased in extent.

Present state.—Patient was of small build and nervous appearance. When he was brought into my room, the whole of the ocular conjunctiva of the right eye was strongly injected, the cornea and aqueous humour hazy, the iris dull, the pupil narrow and displaced a little upwards and inwards, and seemingly obstructed by a whitish mass. The eye was extremely irritable and sensitive both to the touch and to light, and, as there was no doubt that we had a case of acute iritis before us, I put a strong solution of atropia into the eye. This I repeated four or five times, at intervals of about five minutes, not examining the eye meanwhile.

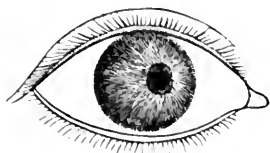


Fig. 1.

Fig. 1 represents its appearance when I first saw it. It shows the displacement of the pupil and its irregular outline, also the loss of its normal black colour, although the whitish flakes in the pupillary

region are not sufficiently represented in the woodcut.

When I went to examine the patient in the dark room half an hour later, I was surprised to find the following unexpected picture, which is reproduced very

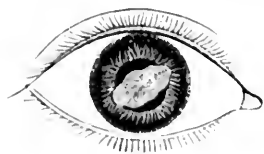


Fig. 2.

accurately in Fig. 2. The cornea looked quite clear, the pupil was fairly dilated, but almost covered by an oval whitish cyst-like form in the anterior chamber. Its long axis extended from the outer

and lower part upwards and inwards, and occupied the

central part of the anterior chamber. It was attached to the anterior surface of the lens a little upwards and inwards from the centre by a small oval ring of white colour, corresponding to the place which is taken by the pupil in Fig. 1, and both poles of this ellipsoid overlapped the iris. The cyst was almost transparent, with the exception of its whitish attachment near the centre of the lens. There seemed to be a second feeble attachment at the lower and outer extremity between the posterior surface of the cyst and the anterior surface of the iris. However, as the eye was very sensitive to light, in spite of cocaine, neither my colleagues nor myself could make this point absolutely certain; and, although eagerly watched for, no spontaneous movements could be confirmed during the short periods for which the patient would stand observation by concentrated light. I therefore abstained from further examination that day, gave him atropia and cocaine to take home, and told him to discontinue his medicine.

The next day, January 28th, a great change had taken place. The inflammation had somewhat decreased, the pupil was a little wider than on the previous day, and quite round, and the cyst reduced to about one-fourth of its former size, showing the appearance depicted by Fig. 3. The bladder had evidently burst, and lay collapsed round the oval attachment, which was as clearly visible as the day before. It was now quite within the area of the pupil, and still transparent; but no traces of movement could be detected, although the eye stood a much longer exposure to light that day; nor could any detached parts of the cyst be detected lying at the bottom of the anterior chamber.

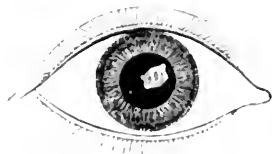


Fig. 3.

The following day the remnants became still smaller and more opaque. The *left* eye, however, quite well

hitherto, became acutely inflamed and chemotic, and the eyeball protruded so far that the lids were unable to close. This state lasted for two days. It gradually subsided under warm cataplasms, and the left eye became quite well in five days.



Fig. 4.

On January 30th the *right* eye looked as shown in Fig 4. The cyst had shrunk to a small yellowish opaque mass, which disappeared within the course of a few days, leaving no trace whatever on the lens.

These were the facts of the case, the interpretation of which is rather puzzling. When I saw the state represented in Fig. 2, the only conclusion I could arrive at was that we had a case of cysticercus in the anterior chamber. The size of the cyst, its shape, its transparency and its delicate membrane, as well as its attachment to the anterior surface of the lens, spoke in favour of this view. That no movements could be observed, if the cyst were a living cysticercus, might be explained by the circumstance that the patient's state did not admit a prolonged examination, and that perhaps the strong solution of atropia, which had acted well on the pupil, had also had an effect on the parasite. It is stated by other observers that atropia has been seen to restrict the movements of a cysticercus in the anterior chamber.

I remarked before that the cyst seemed to be attached to the anterior surface of the iris (Fig. 2) at the poles of the ellipsoid. We can easily imagine, if such was the case, how the iris, stretching under the influence of the atropia, pulled upon the delicate membrane of the cyst, and as the latter was fixed principally to the lens, its membrane probably tore, allowing the fluid contents to escape into the aqueous, and the cyst to collapse round its whitish oval attachment (Fig. 3). We know that a cysticercus usually dies when the sac is ruptured. That

the dead parasite should disappear completely within a week is not unlikely when we consider how readily the aqueous humour absorbs lens-matter and other substances.

No light could be thrown upon the case by questioning the patient about his mode of living. He was not in the habit of taking underdone food. Whether the sudden attacks of epilepsy from November last till lately owed their origin to a cerebral parasite; whether the acute inflammation and œdema of the left eye had any relation to a cysticercus, are questions which cannot be answered in a positive manner.

If we do not admit the cyst to have been a parasite, we may accept the theory that it was an iris-cyst; but there is very little in support of this view. The thinness of the membrane, its adhesion to the lens which proved to be its principal, if not its only, attachment, the complete freedom of the iris from any abnormality on the 28th of January (Fig. 3), are very much against any such explanation.

There is a third theory left, and that is, that the cyst (or pseudocyst?) was perhaps nothing else but an exudation, the product of a plastic iritis, caused possibly by the internal use of iodide of potash. Against this I must point to the readiness with which the iris obeyed the atropia, to the absence of any synechia, and to the attachment of the cyst on the lens. I may mention that the possibility of such a plastic iritis, produced by the internal use of iodide of potash, occurred to us, and, although I have never seen an undoubted case of such "iodism," we tried to arrive at the truth with our patient. We therefore gave him for three distinct periods his medicine (iodide of potash, gr. 5, three times a day). The first time conjunctivitis of the right eye was the result; the second time the left eye was similarly affected; and the third time no effect whatever was produced. Nor was a trace of any plastic exudation observable in the anterior chamber.

I may mention that I examined the patient a few days ago, and found his vision the same as in the beginning of February, viz : for both eyes $V = \frac{30}{20}$ with 1.25 D concave.

If our case were really one of cysticercus—and from all appearances this seems the most likely theory—there is an important practical point to be gleaned : for we have before us a parasite which has resolved itself. Would it not be advisable, therefore, in any case where we see a living cysticercus in the eye, whether in the anterior chamber or in the vitreous or subretinal, to needle the sac, and thus to allow a free escape of its contents into the surrounding media ? If this trivial operation fail, there will be ample time left to resort to more heroic measures.

ON MASSAGE IN CERTAIN EYE AFFECTIONS.*

BY SIMEON SNELL,

OPHTHALMIC SURGEON TO THE SHEFFIELD GENERAL INFIRMARY, AND TO THE INSTITUTION FOR THE BLIND.

I do not think that massage is much used by ophthalmic surgeons, and my object in this short communication is to direct attention to what I believe to be a most useful remedial procedure.

After reading Pagenstecher's article on "Massage in Diseases of the Eye," in Knapp's *Archives of Ophthalmology* for 1881, for a time, I carried out his suggestions in a half-hearted manner, and then more or less discontinued doing so.

For some time, however, I had learnt to appreciate the very different effect on various affections of the yellow oxide of mercury ointment, if the applications

* Read before the Ophthalmological Section, B. M. Association, Brighton, 1886.

were made by myself instead of by the friends of patients at home. And as in each instance I not only inserted the ointment into the eye but allowed it to diffuse itself, and then rubbed the eyelids well about, I gradually came in this manner to increase the friction, and learnt that the plan of massage adopted was a valuable curative one.

After reading afresh Pagenstecher's article, I am able to corroborate his general conclusions as to the value of massage, and to agree with him as to the class of cases suitable for its employment. My experience is with a more limited variety of cases than Pagenstecher's.

It is, of course, easy to say, as Dr. Spalding, the translator of Pagenstecher's article, does in one of his own immediately following, that the effects resulted from the employment of the yellow oxide of mercury ointment, which Pagenstecher, like myself, used whilst adopting massage. The value of this ointment alone in certain cases is, of course, unquestioned. The number of cases, however, which at different times have come under my notice, in which the yellow ointment has been employed at home for some time with little or no benefit, and the very different conditions resulting when the plan I am going to advocate has been adopted, compel me to the conclusion that the method of friction used is the more important factor in bringing about a cure. I am free to admit that in many cases the yellow oxide ointment will be a useful adjuvant, and, therefore, for this reason I almost invariably employ it, instead of some simple lubricant, as vaseline. I believe a lubricant to be desirable, and I do not use massage without one.

The yellow oxide of mercury ointment employed by me has generally been of the strength of one grain to a drachm of vaseline. For corneal maculae the application is often stronger.

The mode of using the massage has been this. The

lower eyelid is drawn down, and a piece of ointment inserted ; it is allowed to remain there to liquefy and to become diffused, which is facilitated by a little gentle movement up and down of the lower eyelid. The eyelids are then taken separately or together, and rubbed gently but quickly over the eye, and even in certain cases the conjunctival surfaces of the eyelids against each other. With a little practice the eyelids will readily be got to gently slide over the eyeball ; one finger is often sufficient, and the motion may be made not only from side to side and up and down, but also in a circular manner. The massage is pursued for a varying time in different cases, but, generally speaking, it is continued until the ointment is well diffused everywhere on the surface of the eye, and much of it is rubbed out of the eyelids. It is well to avoid rendering the eyelids greasy, as it causes the fingers to slip, and prevents the gliding of the eyelid over the lubricated surfaces below. When necessary the massage may be confined to a particular spot, as, for instance, maculæ or pustules of the cornea or conjunctiva.

The procedure is not unpleasant. Many assert immediately that the eyes are more comfortable, and even in children there is seldom any difficulty in repeating the process as often as is deemed necessary. After the lapse of an hour or more, patients sometimes feel the eyes hot and uncomfortable, but this is not long in passing away, and is followed by comfort and ease.

Massage will, I believe, be found useful in most cases of chronic affections of the conjunctiva and cornea. In the common, simple form of conjunctivitis, arising from some irritant, as tobacco smoke, or remaining after a more acute conjunctivitis, massage is very serviceable, and it will often be well not only to rub the eyelids over the eyeball, but the inner surfaces of the eyelids against each other. A cure

will result speedily with the use of massage in many cases of Catarrhal Ophthalmia. As to the cornea, in indolent ulcers, in maculæ, and some forms of pannus, massage will be found of distinct value. The use of it in affections of the conjunctiva and cornea is indeed extensive, and is, I fancy, bounded only by one distinct limit, and that is that in irritable, watery eyes, and those in which experience teaches us to forbear the use of an irritant, such as the yellow oxide, its employment will generally be contra-indicated. At the same time success has followed its use in cases beyond the barrier mentioned.

Some time since, a young woman who had suffered for some months from conjunctivitis, with swelling of eyelids, and subsequent pannus of the cornea, came to me. She was scrofulous, and had been under treatment elsewhere with little benefit. Massage, with yellow ointment, was adopted at first daily, then after improvement, which immediately ensued, every alternate day. In two or three weeks she was well.

Just recently, a delicate girl with an ulcer of cornea and sufficient conjunctival secretion to glue the eyelids together in the morning, was under my care. Internal remedies and local applications, including the use of the yellow ointment at home, were prescribed. She came from the country, and at her occasional visits massage was employed, and she was always better for a time. This continued for several weeks. Her parents then left her in Sheffield, and every day she came for massage, with the yellow oxide ointment. At the end of a week she returned home apparently cured. Some weeks later she was again seen, and still remained well.

These cases will suffice to illustrate the method described.

If opportunity afford at first, massage is performed daily; I have not employed it more frequently. As improvement takes place, every alternate day will suffice.

The *modus operandi* is not difficult to understand ; the friction of the surfaces together stimulates the vessels to increased action and encourages the absorption of inflammatory products.

My experience warrants me in still pursuing the method in, I believe, a widening class of cases, and those who adopt it will find massage a remedy of distinct value.

Since the foregoing paper was written and read before the Section at Brighton, massage has been employed by me in a large additional number of cases. The results obtained have been very gratifying, and thoroughly support the opinions expressed with a more limited experience.

STOELTING (Hanover). Glaucoma after Linear Extraction. *Archiv f. Ophth.* Vol. 33, p. 177.

SCHLEGTENDAL (Rostock). Supra-Choroidal Oedema in Glaucoma, an Artificial Product. *Klin. Monatsbl. f. Augenheilk.*, Feb. 1888, p. 91.

Stoelting records a case in which glaucoma followed extraction of senile cataract, and led, ultimately, to the excision of the eye. He gives the clinical history and the results of microscopical examination in detail, and concludes with some inferences as to the pathology of glaucoma. The second article named above is devoted to showing that certain of the changes described by Stoelting were not pathological, but were artificially produced by the method of preparation. The latter view appears to us to be the true one, but the paper is of considerable value notwithstanding.

Von Graefe was the first to call attention to glaucomatous complications after cataract extraction ; in his experience they arose from imperfections in the operation— incomplete removal of the cortex, incarceration of the iris in the cicatrix, iritis with synechia, &c. The subsequent

literature of the subject is extremely meagre, rather, as the author supposes, through indisposition on the part of surgeons to record such cases than through their rarity.

Stoelting's case was briefly as follows :—A woman aged 64, previously operated on with good result for senile cataract in the left eye, desired the same treatment for the right. *Nov. 24th*: Extraction of over-ripe cataract by the modified Graefe method with iridectomy; the anterior chamber not re-established until the 10th day, but progress otherwise good; on the 14th day tension considerably increased, with cloudiness of the cornea and circumcorneal injection; eserine, pilocarpine, and warm compresses gave no permanent benefit. *Dec. 22nd*, high tension having persisted 16 days an incision with the linear knife, parallel with the scar, and through the whole pupillary area; small portions of vitreous prolapsing through the wound were removed on the three days following, and finally the wound was touched with the galvano-cautery; it closed and high tension returned. *Dec. 29th*, sclerotomy downwards and outwards, whereupon a fine fibrinous membrane coating the ligamentum pectinatum became visible against the back of the knife; tension, at first reduced by the sclerotomy, rose to the normal in a few days and above it a little later. *Feb. 2nd*, a second sclerotomy downwards and inwards; the effect of this disappeared in three days. *Feb. 8th*, a wide iridectomy downwards and inwards without loss of vitreous; on the following day the cornea was clear, but 5 days later high tension had again returned; fundus-reflex and projection still good. *Feb. 25th*, incision with keratome and a large piece of the thickened capsule drawn out with the iris hook and excised, giving free communication between vitreous and aqueous chambers; no loss of vitreous; tension, at first sub-normal, returned in a few days. *March 7th*, the original wound reopened by an incision close to it on the corneal side; the capsule adherent to it seized with forceps and torn away; considerable loss of vitreous; high tension returned two days later. *March 13th*, excision of the eye.—A grand total of eight operations upon one eye within a period of 16 weeks!

The eye imbedded in celloidin was examined in sections

under the microscope. The changes observed are minutely described; the most important were the following:—The lens-capsule was incarcerated in the extraction-cicatrix, and the iris-stump was firmly adherent to the cornea throughout the length of the cicatrix. The angle of the anterior chamber was closed by peripheral adhesion of the iris throughout the whole circle. The adherent periphery of iris was much thinned; its thicker free portion presented deep folds and a very short radial measurement. The adhesion appeared to have been caused by pressure of the iris-base against the periphery of the cornea, without any considerable inflammatory reaction. The ciliary processes were much enlarged and elongated, and, together with the inner angle of the ciliary muscle, were driven forward far in advance of their normal position. The choroid exhibited well marked changes, the chief of which was an oedema of the whole membrane; the sign of this oedema was an enlargement of the supra-choroidal lymph-space, the meshes of the supra-choroidal tissue being in many places very widely opened. The whole of the uveal tunic presented a high degree of venous hyperaemia, and in the neighbourhood of the extraction cicatrix it contained numerous extravasations of blood. These changes were least marked in the region of the posterior pole.

Stoelting, guided by these appearances, explains the cause and course of the glaucoma as follows:—The incarceration of the capsule and iris in the wound caused a dragging upon the ciliary body. This dragging led to inflammation of the choroid, to closure of the lymph-channels around the *venae vorticosae*, and to lymph-stasis in the supra-choroidal space, thereby causing an encroachment on the space filled by the vitreous. The vitreous was of abnormally (!) firm consistence and was therefore driven forward as a whole, and pressed unduly upon the ciliary processes; the displacement of the ciliary processes, in its turn, pressed upon the iris-base and closed the angle of the anterior chamber. The closure of the angle of the chamber was therefore, in this case, “not the cause, but the consequence, and indeed the last consequence, of the glaucoma.”

The article concludes with lengthy references to the

writings of other authors concerning the changes found in eyes blinded by glaucoma.

Schleghtendal addresses himself to the question of the alleged supra-choroidal oedema described by Stoelting. He points out that overfulness of the *venae vorticosae* does not prove that the lymph spaces surrounding these vessels are closed; these lymph spaces, which were not visible to Stoelting, are not usually discoverable by the method which he employed; an artificial injection of them is necessary to render them visible. He suggests the doubt whether the pressure in the *venae vorticosae* could suffice in presence of a greatly increased intra-ocular pressure, to maintain so great a lymph-stasis as Stoelting describes, the lumen of the vessels being open as expressly stated in the description.

Passing to actual facts observed by himself, Schleghtendal points out that in eyes examined by the celloidin method, more or less separation of the tunics and a widely opened supra-choroidal space are very frequently to be seen. In glaucoma-specimens of his own, presenting a high degree of venous hyperaemia in the choroid, he finds widening of the supra-choroidal meshes corresponding closely with Stoelting's figures and description, but he finds it to be due, beyond all question, to the displacement and partial separation of the tunics which the shrinking of the celloidin inevitably produces. A close examination of many such specimens lends no support to the idea that these displacements arise through an impeded outflow of lymph from the supra-choroidal space.

Briefly to summarise the foregoing, Stoelting holds that the starting point of the glaucoma in his case was a traumatic choroiditis; that the onset of glaucomatous tension was the expression of lymph-stasis between choroid and sclera; that the final result of the glaucomatous pressure was the closure (at a point of time not indicated) of the angle of the anterior chamber. Schleghtendal, without discussing the general question of the causation of the glaucoma, urges with great show of reason that the evidence in favour of the supra-choroidal oedema is fallacious, in short that the appearances described were produced artificially after the excision of the eye.

We venture to think that while Stoelting comes very near the truth in his description of the glaucoma process, he curiously misses it when he invokes the aid of an unproved and improbable oedema widely separating the choroid from the sclera, and denies the essential importance of the closure of the chief outlet of the eye. We regard it as certain that glaucoma cannot exist so long as the aqueous fluid can escape freely through the angle of the anterior chamber, and, further, that the onset of high tension in every form of glaucoma corresponds, in time, with an obstruction of one kind or other at this outlet. Closure of the angle of the anterior chamber is certainly *not the starting point* of the process; it must itself acknowledge some antecedent cause; but all the morbid processes which lead to glaucoma are found, when we examine them closely, to obstruct the angle of the anterior chamber, and precisely when that obstruction arises, the glaucomatous complication begins.

In the particular case of glaucoma here in question, Stoelting shows that the angle of the chamber was closed by the pressure of a consistent vitreous against the ciliary processes and, through them, against the iris-base. He shows further that the forward pressure of the vitreous was due, in all probability, to the thickening of the choroid. We should question his view only in so far as he attributes the thickening to a supposed supra-choroidal lymph-stasis rather than to a general choroidal hyperaemia. The causation of glaucoma by hyperaemia of the uveal tract in the manner here suggested was discussed some months ago in a paper in these pages (*O. R.* July, 1887, p. 191).

P. S.

VAN GENDEREN STORT (Haarlem). On the Changes in Form and Position of the Retinal Elements, under the Influence of Light and Darkness. *Arch. f. Ophthalm.* Bd. XXXIII. 3, pp. 229-292.

The experiments of which this paper is a record were undertaken by Stort in the Physiological Laboratory at

Utrecht in 1883, with the intention of repeating and extending those on the same subject previously made by Angelucci and Kühne. The retina of the frog, salamander, perch, and pigeon were employed in this investigation, and the results are recorded in careful detail and at considerable length.

The following abstract will be necessarily much condensed, and will lack the very beautiful coloured lithographic plates with which the original article is embellished. It will save time and words if, at the outset, we explain some of the terms which occur repeatedly throughout the paper. By "Lichtfrosch" (Light-frog), which we shall designate L-frog, is meant a frog which has been exposed to daylight for a varying period (usually some hours) before being killed and its eyes removed for examination. By "Dunkelfrosch" (Darkness-frog), or, for brevity, D-frog, is meant a frog which has been kept in absolute darkness for some hours, then killed, and the eyes removed quickly in a sodium light. The same explanation will apply to the other animals, and we shall speak of the L-perch, the D-triton, and so on.

Stort first ascertained that, in order to show the maximum retraction of the pigment layer of the retina, a frog must be kept in absolute darkness for at least four hours. The pigment is then found collected in the base of the epithelial cells, about the apices of the rods. In addition to this change, however, he observed that the cones had undergone certain alterations, and did not lie with their bases on the external limiting membrane, but had moved outwards, so that they were situated between the outer segments of the rods; a thin, thread-like process extended inwards, and became connected with a cone-granule of the outer granule layer. In L-frogs the pigment had sunk usually as far as the membr. lim. ext. At the same time, the cones had moved inwards, so that their ellipsoids lay between the inner segments of the rods. These alterations in *position* are very important, as indicating a vital reaction of that part of the cones situated between the cone-granule and the ellipsoid, under the stimulus of light, and possess great interest as a hitherto unknown example of photo-mechanical

irritation of protoplasm. Moreover, it is a distinct advance in our knowledge of the physiology of sight, which until now has been limited, so far as actual structural change in the retina under the influence of light is concerned, to the alteration in colour of the visual purple, and the movement of the pigment of the hexagonal epithelium layer (Boll), and certain electrical phenomena (Holmgren). For these reasons, Stort paid special attention to these changes, and throughout this series of experiments has confined his observations to the pigment and bacillary layers of the retina.

A.—OBSERVATIONS ON THE RETINA OF THE D-FROG.

The frogs were kept in absolute darkness for from four to twenty-four hours, then killed, and the eyeballs removed as quickly as possible. The retinæ were hardened in a 3% solution of nitric acid, and the sections examined in Glycerine.*

The brown pigment in such retinæ is seen to be collected in the bases of the epithelial cells, and round the outer third of the rods. In addition to this, Stort found in fresh preparations a bright yellow coloration of the protoplasm of the epithelium cells extending as far inwards as the boundary between the inner and outer segments of the rods. This yellow substance, he believes, is of the same nature as retinal purple, being secreted by the hexagonal cells, and bleaching on exposure to light.

Stort describes three varieties of cones in the frog's retina, differing in form, size, position, and contractility:—

- (1) Movable globule-cones ;
- (2) Smaller movable cones without globules ;
- (3) Immovable cones without globules.

(1) *Movable globule-cones*. These consist of an outer segment of the usual conical shape, and an inner segment in which three parts can be distinguished ; (a) a feebly refracting, contractile protoplasm, directly continuous inwards with the protoplasmic case of the cone-granule, and extending peripherally in a very thin layer to (b) the comparatively strongly refracting opticus ellipsoid ; in the outer end of this

* This method of hardening was also employed for the retinæ of other animals, and though the author had tried different reagents, he concluded that this gave the most satisfactory results.

latter part lies (c) the strongly refracting globular oil-drop. Of these three parts (a) alone requires further description. Its most noticeable property, that of contractility, led the author to name it the "cone-myoid." The cone-myoids of the D-frog are generally seen as long, thin threads, which extend straight outwards from the cone-granules between adjacent rods to the opticus-ellipsoids. Their size is not always the same throughout their length, that part next the ellipsoid being frequently appreciably thinner than the rest. The apex of a cone whose myoid is of maximum length reaches beyond the summit of the rods, and touches the inner surface of the pigment cells. Usually, however, the position of these cones is such that the boundary between the inner and outer segment lies on a level with the middle third of the rods. Whatever the length of the myoid may be, the form and dimensions of the ellipsoid, and of the outer segment of the cone, undergo no recognisable change.

(2) *Small movable cones without globules.* These cones are present in both the peripheral and central parts of the retina, but in much smaller numbers than the former kind, and are less easily distinguished on account of their size and the absence of the globule. Their outer and the ellipsoidal part of their inner segments lie between the outer segments of the rods, but nearer the membrana limitans externa than in the case of the globule-cones. The form and structure of the cone and myoid (the absence of the globule excepted) appear, however, to be very similar.

(3) *Immovable cones without globules. Twin cones.* These elements (twin cones) are fairly numerous, and each consists really of two cones, whose inner segments are intimately connected with one another. They may be distinguished as the chief cone and the associated cone. The former is apparently identical with the globule-cone described above (1). The much smaller associated cone is found resting on the myoid of its chief, close to the membr. lim. ext., and attached to an outer granule by a thick, short neck (the chief cone has an attachment to a separate granule). This associated cone consists of an outer and inner segment, the former conical and long, the latter broader than that of the chief cone, and devoid of the oil-globule and the opticus-

ellipsoid, but containing a plano-convex body, the flat side of which is next to the membr. lim. ext.

B.—THE RETINA OF THE L-FROG.

When the frogs have been exposed to daylight for a longer or shorter time, and in clear weather ten to fifteen minutes will suffice, the appearances met with in sections of the retina, treated in a precisely similar way to those of the D-frog's retina, are markedly different. The pigment of the epithelial layer has moved forwards along the thread-like processes of these cells, and fills the interspaces of the outer segments of the rods and cones. It accumulates chiefly between the inner halves of the rods, extending to a point about five or ten μ from the membr. lim. externa, which, however, it very seldom reaches as an effect of exposure to diffuse daylight. In frogs exposed to green light, Stort found that pigment actually reached this limiting membrane. The hexagonal cells are almost devoid of pigment, and the yellow colour of the cells and of the outer segments of the rods is lost, though the oil-globules, as a rule, retain their colour. The large nuclei of the epithelial cells can now be perfectly seen.

The opticus-ellipsoids of the globule-cones have become invisible, and the cones themselves, now situated between the inner segments of the rods, are surrounded by dark pigment, and not easily distinguishable. This is the condition of the retina commonly represented in anatomical works.

The three kinds of cones have undergone changes which merit separate description.

(1) *Movable globule-cones*.—These now rest with broad bases on the membr. lim. externa. Their inner segments are flask-shaped and lie between the inner segments of the rods in such a position that the oil-globule of the opticus-ellipsoid is slightly beneath (internal to) the division between the outer and inner segments of the rods. Their outer segments are closely enveloped in pigment. The opticus-ellipsoid is a little broader and shorter than in the retina of the D-frog, this change being apparently a passive one, consequent upon the shortening and thickening of the surrounding myoid. This latter structure is now a short,

thick fibre, of the same width at its peripheral attachment to the opticus-ellipsoid and its central attachment to its cone-granule.

(2) *Small movable cones without globules*.—Like those of the former group, these cones are found close to the membr. lim. ext., but on account of the sheathing of pigment are less easily distinguished than in the retina of the D-frog. The myoid approaches in breadth the opticus-ellipsoid, and the outer segment of the cone lies between the rods at the commencement of their outer segments.

(3) *Twin cones*.—The myoid of the chief cone has undergone so much contraction that the opticus-ellipsoid is drawn in close to the inner segment of the associated cone, and the inner segments of the chief and its associate are at almost the same level. The chief cone, however, rises higher than its associate, and the oil-globule is always above (external to) the junction of the two segments of the rods.

Measurement proved that the length and breadth of the associated cone were precisely the same as in the retina of the D-frog, showing that it underwent no contraction on exposure to light.

The *pigment* of the frog's retina consists chiefly of fine acicular particles and granules; but the former largely predominate, and Stort thinks that these needles alone change their position under the influence of light. When retracted to the maximum (after 24 hours in complete darkness), the pigment surrounds about the outer third of the rods, and as the movable cones have extended outwards, their outer segments are imbedded in the pigment. The centrifugal movement of the pigment is quite regular, whereas its movement inwards, towards the external limiting membrane, is irregular; after short exposure to light, long streaks of pigment are visible stretching in between the rods and cones; after a longer exposure it is found reaching nearly to the limiting membrane. Further action of light leads to its collection there in greater quantity, and, as mentioned, the action of green light brings it right up to the membr. lim. externa.

The retina of the perch and of the Triton Cristatus were

examined in the same way by Stort, both after exposure to daylight for a varying number of hours, and after a prolonged stay in absolute darkness. We shall be unable to do more than notice a few points in his description. Speaking generally, the changes effected by light were very like those observed in the frog's retina.

In the retina of the D-perch the cone-myoids are long threads, broad at their union with a cone-granule and an opticus-ellipsoid, thinner in the middle part. They stretch straight inwards. When maximum stretching of the myoid has occurred the apices of the large cones project beyond the ends of the rods, and the rods next to one of these cones undergo a mechanical displacement, their outer segments being bulged by the large opticus-ellipsoid of the cone. The single movable cones change their position more than do the chief cones of the twin-cones, perhaps because being smaller they meet with less resistance from adjacent rods.

In the retina of the Triton, Stort found two sorts of cones, simple movable cones and twin-cones.

The former are very like the small movable cones of the frog; the latter, as in the frog's retina, consist of a chief cone (movable) and a fixed associated cone. In the perch, they are better described by the term "double cone," since they consist of an inner segment from which two outer segments spring: the single inner segment has a double opticus-ellipsoid, but only one myoid.

In the retina of the D-Triton the outer granules form but a single layer, the rod-granules being external to the *membrana limitans externa*. In the retina of the L-Triton, on the other hand, the rod-granules are entirely internal to the membrane, and there are consequently two rows in the layer of outer granules. The changes in the pigment and the cones in the Triton's retina are almost identical with those described in the retina of the frog.

The retina of the pigeon was also the subject of investigation. The description given is, however, chiefly anatomical, and of such length that we must pass it by, merely remarking that the changes induced by the action of light are no less definite than those seen in the frog's retina, though owing to the more varied structure of this

tunic in the pigeon (with its red and yellow areas and its different kinds of cones) the alterations are less easily observed and described.

Stort concludes his paper, which is one of great interest and value, by stating that, although he has as yet made but few observations on the retinae of mammals, he is able to say that in the eyes of man and pigs, the inner segments of the retinal cones undergo changes in form similar to those described as occurring in the same elements of the frog, perch, etc., under the influence of light, and that, consequently, they should also be called myoid.

R. MARC'S GUNN.

J. B. L.

ALFRED GRÆFE (Halle). Operations indicated in Paralytic Strabismus. *Von Græfe's Archiv*. XXXIII., Abth. 3, p. 179.

The publication of Landolt's case of tenotomy of the inferior oblique has been the means of bringing this valuable paper before the ophthalmological world. Græfe, at the outset, observes that, in the nature of things, but few cases of paralytic squint are suitable for surgical interference, and then proceeds to lay down the principles upon which all operations in such cases should be based. The operations in question are : (1) Advancement of the paralysed muscle, which Græfe styles the substitution operation (*substituierende*); (2) Tenotomy of the antagonist, "the equilibrating operation"; (3) Tenotomy of the associated antagonistic muscle of the sound eye, "the compensating operation."

In deciding between these three operations, the preference is to be given to that which most successfully aims at restoration of binocular vision.

In paralysis of the internal or external rectus it is possible to make use of each of the three methods, either alone or in combination. In the case of paralysis of the left abducens, with a defect in mobility of about three mm. and only slight secondary contraction of the internus, advancement of the paralysed muscle is the proceeding usually adopted; and

Græfe does not absolutely reject this method, as good results can be obtained by its means. However, the permanent effect of this operation rarely equals the immediate, and the question arises as to whether an equilibrating or compensatory tenotomy may not, on the whole, produce better results. The latter, indeed, causes symmetrical defects in the motions of the eyes to the left, and correspondingly erroneous projection immediately after the operation; but this disappears so rapidly that it is of no practical importance. Albrecht von Græfe, in his work on this subject, gave the preference to the equilibrating operation, and for two reasons: (1) The tendency to hold the head crooked that must occur after the compensatory operation; and (2) the disturbance likely to be produced in the balance of accommodative movements. Against this must be urged the drawbacks of the equilibrating method: that the operative effect is produced towards just that side towards which it is least desirable that it should. For fear of injuring accommodative convergence, it is rarely possible to weaken the internus enough to neutralize the paresis of the abducens, and the result must be only a small central binocular field with crossed diplopia to the right, and homonymous diplopia to the left of that region.

Alfred Græfe has no hesitation in preferring the compensatory operation to the equilibrating in those cases where one of these operations is sufficient to effect a cure; in the more severe cases he would advocate the combination of the two operations, and, if necessary, the advancement of the paralysed muscle at the same time.

Græfe takes paralysis of trochlearis to exemplify the principles of treatment in paralysis of the elevators and depressors of the eye. The positions of the obliques prevent surgical interference with their scleral insertions, therefore the advancement of the superior oblique and the tenotomy of the inferior oblique are both impracticable. In the strict sense of the term, too, a compensatory tenotomy can hardly be carried out, as the upward and downward movements of the globes require the combination of four muscles in each eye. The two superior or two inferior recti can no more be regarded as associated muscles than the two inferior obliques or the two superior obliques; however, those movements are

strictly associated, though not indeed to the fullest extent, which are effected by the oblique muscle of one eye and the corresponding rectus of the other eye. This relation is preserved in the movements of the eyes to either side. In looking to the right the depressing effect of the left trochlearis increases, as does that of the right inferior rectus ; in looking to the left the depressing power of both muscles diminishes. With respect to the inclination of the meridians, a completely analogous relation exists.

This associated mechanism allows us to express a paralysis of any one of these muscles in terms of the sound eye : Paralysis of the left trochlearis may be regarded as spasm of the right rectus inferior ; paralysis of the left inferior oblique as spasm of the right superior rectus, and so on. Græfe accordingly recommends in trochlearis paralysis the compensatory tenotomy of the rectus inferior of the other eye, and condemns, in the strongest terms, both the equilibrating tenotomy of the inferior oblique of the affected eye and, what has also been recommended, the tenotomy of its superior rectus.

He has performed the compensatory tenotomy of the inferior rectus some twenty times, and always with decided benefit, often with complete success. He has also performed the operation in lesions of the trochlearis not caused by paralysis. With respect to the dosage, he lays down the following rules: If the effect immediately or some hours after the operation be incomplete, so that perhaps in the middle line, or on movements downwards, diplopia still exists, he waits for two or three days and breaks down the adhesions at the muscular insertion. If the result be excessive, so that, on looking downwards 20 or 30 degrees, operative insufficiency shows itself, he inserts a suture to diminish the operative insufficiency.

In cases where secondary contraction of the rectus internus is present, it is usually necessary to tenotomise that muscle also. The same principles guide him in dealing with paralysis of inferior oblique, of which he details one case. The paralysed muscle was on the right side, and the symptoms simulated closely those of a spasm of the left superior rectus.

Græfe next deals with the operations in isolated paralysis of one of the muscles of the second pair; here compensatory tenotomy is inapplicable. In a certain sense compensation is effected if the synonymous muscle of the other eye be tenotomised. For instance, in paralysis of the left inferior rectus tenotomy of the right inferior rectus will diminish the vertical distance of the double images, but the parallelism of the retinal meridians will be utterly destroyed, and in looking to either side the vertical diplopia will reappear in a most troublesome way. The choice, therefore, lies between advancement of the paralysed muscle and equilibrating tenotomy of the antagonist. The unavoidable drawbacks in this latter operation will be found of more practical importance in paralysis of the superior than of the inferior rectus, but they are in both cases so serious that Græfe, while he does not reject the equilibrating tenotomy altogether, elects, in paralysis of the muscles of the second pair, advancement of the paralysed muscle before all other operations.

This very interesting paper concludes with a criticism of cases published by Knapp and Hotz, which were operated on with varying success, by one or other of the methods described above.

J. B. S.

L. LEPLAT (Liège). On the Regeneration of the Aqueous Humour after Paracentesis of the Cornea. *Annales D'Oculist.* January—February, 1887, p. 75.

The very instructive experiments described in this paper deserve study in connection with the similar series concerning the nutrition of the vitreous body of which a notice appeared in our March Number (O. R. March 1888, p. 84). Their special object was to investigate a point observed by Deutschmann nearly ten years ago (Græfe's Archives XXV., 1, 1879).

Deutschmann observed that the aqueous chamber of the human eye, if evacuated by puncture shortly after death, is refilled with colourless fluid within a few hours. He

ascertained that the same thing occurs in the freshly excised eye, and concluded that the only possible source of the regenerated fluid is the vitreous humour.

Leplat experimented with living rabbits by the method described in the previous abstract, viz., subcutaneous injection of iodide of potassium, and subsequent examination of the excised and frozen eye-balls by means of the starch-test for iodine. After such injections iodine is found in the aqueous humour at the end of about ten minutes, and in the anterior part of the vitreous about ten minutes after its appearance in the aqueous.

Leplat made two chief series of experiments. The first was of the following kind :—One anterior chamber was evacuated by incision, and the subcutaneous injection was given immediately afterwards. During the following ten minutes the chamber was kept empty by re-opening the puncture several times; then the puncture was allowed to close, and ten minutes later, the chamber being refilled, both eyes were carefully excised, frozen, and divided. The frozen aqueous was removed from each and tested for iodine. Under these circumstances it might be expected that the aqueous of the punctured eye would show a higher percentage of iodine than that of its fellow, for it would not be diluted by the normal aqueous already in the chamber at the commencement of the experiment, as in the case of the non-punctured eye. The actual fact, however, was the opposite of this. The aqueous of the punctured eye always contained a smaller proportion of iodine than that of the non-punctured eye: a proof that the regenerated fluid was derived not directly from the blood in the ciliary vessels but in part at least from the vitreous body into which the iodine had not yet found its way.

In a second series of experiments the anterior chamber was evacuated at a time when the vitreous body was impregnated with the iodide, viz., two hours after the subcutaneous injection. Twenty minutes later, the chamber being refilled, both eyes were examined as before. Under these circumstances the aqueous of the punctured eye always contained more iodine than that of the non-punctured eye. To remove the objection that this difference might arise

simply from the lesser tension and consequent hyperaemia of the punctured eye, Leplat experimented further as to the effect, *per se*, of a lowered tension. He lowered the tension by withdrawing a small quantity of fluid from the vitreous chamber only, and found that, in fact, the amount of iodine in the aqueous was soon increased thereby. He therefore repeated the former experiment, taking care to lower the tension equally in the two eyes, evacuating the aqueous chamber of the one eye, withdrawing fluid from the vitreous of the other. Again he found the regenerated aqueous richer in iodine than the other.

These two complementary sets of experiments prove beyond question that regeneration of the aqueous after evacuation of the anterior chamber depends in part, and in large part, upon fluid derived from the vitreous, as originally pointed out by Deutschmann in the case of dead and excised eyes. They show that fluid passes very readily through the hyaloid membrane and zonula. They do not show that a current of fluid travels in this direction under normal conditions. The normal escape of fluid from the vitreous body forms the subject of the paper which has been already noticed.

P. S.

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ABSTRACTS OF LECTURES ON THE PHYSIOLOGICAL AND PATHOLOGICAL CONDITIONS OF THE PUPIL AND ACCOMMODATION.

DELIVERED AT THE ROYAL COLLEGE OF SURGEONS OF ENGLAND,
FEB. 27TH, 1888,

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LECTURE I.

On the Pupil.

These lectures are intended as an adjunct to the lectures delivered last year by Professor Jessop on the Intra-ocular Muscles of Mammals and Birds.*

The lecturer commenced by describing the different methods employed for estimating the size of the pupil, and showed the pupillometers of Follin, Hutchinson, Galezowski, Coccius, Fick, Nettleship, Priestley Smith, Jessop, Landolt, etc. The difficulties met with in obtaining an accurate measure were pointed out, and that to obtain an entirely correct result it was necessary to use an instrument like Landolt's, but for ordinary purposes the card or wire gauge pupillometers were sufficient.

The pupil is chiefly influenced as to its size by the condition of the muscular fibre in it called the pupillary muscle, but also varies with the condition of its vascular supply.

The pupillary muscle is in mammals composed of unstriped muscular fibre; on stimulating it near the pupillary edge of the iris myosis follows, and on excitation of its ciliary border mydriasis. The nerves pass-

* Ophthalmic Review, 1887, pp. 125, 159, and 315.

ing into the eyeball besides the optic are the long and short ciliary nerves. The short ciliary nerves are branches of the lenticular ganglion of the third nerve, and on stimulating them extreme myosis occurs, whilst on section medium mydriasis.

The long ciliary nerves are mixed nerves, receiving fibres from the nasal nerve and from the cervical splanchnics, and thus possess sensory, vaso-motor, and mydriatic properties. On stimulating all the long ciliary nerves complete ad-maximum mydriasis ensues ; but on excitation of only one, the pupil dilates, as a rule, in only part of its circumference. Section of the long ciliary nerves is followed by medium myosis.

The effect, therefore, of stimulation of either of the opponent nerves supplying the pupillary muscle is an extreme action, namely, complete mydriasis or myosis. The result, however, of section of either of these nerves is a medium contraction or dilatation of the pupil. This is the usual effect in all unstriped muscular fibre ; it is always under the influence of two nerves ; one to put it in extreme contraction, and the other to produce exactly the reverse action ; but section of either nerve does not give rise to an extreme opposite state, owing to the tone or condition of the muscular fibres. This is well seen in the action of atropine, which, by acting directly on unstriped muscular fibre, destroys the tone or completely paralyses it after some time, and hence increases in the pupil the dilatation after section of the third nerve, and also prevents contraction of the pupil on direct stimulation of the muscular fibre by electricity or drugs, as eserine.

Dr. Lauder Brunton has suggested that the elongation, as the shortening, of the muscle cell, on stimulation of the nerves supplying it, is due to the fact of the muscle cell being able to contract in different directions. This may be the correct explanation ; but it is much more likely that the changes in the muscle cell on stimulation of the nerves are of opposed chemical or

electrical reactions, giving rise in one case to contraction, and in the other to relaxation, or movement in the opposite direction. Whichever be the right hypothesis, it is certain that there are no radial fibres in the iris capable of dilating the pupil. The fact of the mydriatic nerves being also vaso-constrictor would tend to point to a change in the muscular fibre, as when the pupil is widely dilated the muscular fibre would not be so well supplied by blood. The reasons for the dilatation of the pupil being not due to vaso-motor change alone were given in the last lectures.

The local action of atropine on the pupil is by paralysing the unstriated pupillary muscle, and so producing mydriasis. The atropinised pupil does not act to light, or sensory reflexes, or to accommodation, and is larger than that produced by section of the third nerve.

Eserine produces extreme myosis, and acts, as elsewhere, by stimulating unstriated muscular fibre; the eserinated pupil still acts feebly to light. The effect of the antagonism of atropine and eserine is that eserine acts as long as the unstriated muscular fibre is not completely paralysed, but if the pupil be completely under atropine it has no effect. Eserine myosis is always overcome by atropine, if the latter be used strong and long enough.

Cocaine acts by stimulating the endings of the mydriatic or long ciliary nerves, and produces an ad-maximum mydriasis, but the pupil always acts to light and accommodation.*

Atropine used with cocaine stops the action of the pupil to light and accommodation, but does not increase the mydriasis.

Eserine easily overcomes the cocaine mydriasis, as it acts directly on the pupillary muscle.

The action of these three drugs is given, as they will be used as factors for diagnosis.

* Proceedings of Royal Society, 1885, p. 432.

Central Connections and Course of the Pupillary Nerves.

—The following course of the nerves has been traced by anatomical, physiological, and, in most cases, pathological means.

The short ciliary or myotic nerves may be traced by the lenticular ganglion to the third nerve, and to its origin from a column of nerve cells in the anterior part of the central grey matter below the aqueduct of Sylvius, beneath the anterior corpus quadrigeminum and the posterior commissure; fibres of the third nerve pass through the red nucleus, and on leaving this proceed through the horizontal bundles of fibres, which probably connect the two third nerves together, as stimulation here gives rise to contraction of both pupils.

The mydriatic nerve course is much longer than the myotic, owing to its communications with the spinal cord.* Ferrier attributes the reason for the cervical splanchnics coming off as low as the second dorsal nerve to the fact that the cervical nerves for the supply of the upper extremity are interpolated between the upper cervical and the dorsal cord.

The mydriatic centre of Waller and Budge is described as situated in the lower cervical and upper dorsal cord, and is connected with the fibres of the second dorsal nerve. There is a centre situated in the medulla oblongata, connected through the spinal cord with the second dorsal nerve, as stimulation of the medulla gives rise to mydriasis if the rest of the mydriatic track be intact.

The only constant pupillary symptom following experiments on the cortex of the brain is that described by Ferrier on stimulating Area 12, comprising the posterior half of the superior and middle frontal convolution in monkeys; this experiment is followed by lateral movements of the head and eyes to the opposite side, with dilatation of the pupils.

* Ophthalmic Review, 1887, p. 127.

Vaso-motor Influences.—The pupil can by experiment be shown to contract on injecting the vessels of the iris, and to dilate on their depletion ; but that the mydriasis produced by stimulation of the mydriatic track is not due to this has been shown.* The slight dilatation of the pupil following on an ordinary inspiration is really due to variation of blood pressure.

Respiratory Influence.—Besides the instance just given, the pupil dilates on every deep inspiration or expiration ; this is due to the stimulation of the mydriatic centre in the medulla by the excess of carbonic acid in the blood.

Pupillary Reflexes.

I.—*Light Reflexes*: (1) Direct, (2) Consensual or Indirect.

(1).—Direct light reflex is the contraction of the pupil observed on throwing light into an eye. This reflex takes place by the optic as the afferent nerve, the third nerve as the efferent, and the centre is situated in the aqueduct of Sylvius or the fourth ventricle. The course of the reflex may be studied best by destruction or stimulation of the track. The reflex is lost—on destruction or detachment of the retina, section of the optic nerve and chiasma, section of both optic tracts (it is probable that the light reflex afferent fibres do not decussate, and follow thus a different course posterior to the chiasma), destruction of posterior part of Sylvian aqueduct or nucleus of third nerve, section of third nerve, ablation of lenticular ganglion, section of all the short ciliary nerves (if all are not destroyed it is still present), paralysis of the pupillary muscle, as by atropine, etc.

Section of the mydriatic track does not stop light reflex ; the pupil, however, being smaller, is not so sensitive to light, and does not dilate well on shading.

(2).—Consensual or Indirect Light Reflex.—In the normal state, if light be thrown into the pupil of the eye

* Ophthalmic Review, 1887, p. 162.

(left, for example), the pupil of the other (right) will contract, and this is called the consensual light reflex of the pupil (right). This action may be stopped by section or destruction of the myotic track in the consensual eye, or by destruction of the afferent light fibres in the eye receiving illumination. It may be present when there is no direct light reflex in the consensual eye, owing to destruction of the afferent fibres of the direct reflex in this eye. The consensual light reflex is still present on section of the mydriatic track ; it is absent if atropine be placed in the consensual eye or both eyes, but is still present if atropine be placed in the eye illuminated.

11.—*Sensory Reflexes*.—The usually described sensory reflex is that obtained by stimulating a sensory nerve, and is, unlike the light reflexes, a mydriasis. There is, however, another reflex, better called, perhaps, “pain reflex,” obtained by painful stimulation of the endings of the fifth nerve about the eye ; this reflex is myotic in character, and is seen especially in cases of abrasion of cornea, etc. It is generally associated with dilatation of the blood vessels, and is probably a reflex dilatation of the blood vessels of the iris giving rise to contraction of the pupil.

The dilatation of the pupil following stimulation of a sensory nerve is best seen if the pupils be moderately lighted ; it is bilateral, and is not present if both third nerves be cut, or the eyes under atropine (section of one third nerve does not stop it in the opposite eye). It is still present slightly after section of the mydriatic track, and is probably due to inhibition of light reflex, as Bechterew first suggested.

ARGYRIA OF THE CONJUNCTIVA.

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Argyria of the conjunctiva, produced by the indiscreet application of nitrate of silver, is happily a rare occurrence nowadays. When, therefore, the other day, an exquisite instance presented itself, it commanded my full attention.

The details of the case are of no importance here. Suffice it to say that the left eye showed an almost black discoloration of the conjunctiva, both in its palpebral and ocular part. The history was that nine years ago the left eye, then suffering from inflammation, had been treated—or rather maltreated—during six months with a very strong solution of nitrate of silver. At present the cornea is covered with opacities, and the conjunctiva, extremely dark, is thickened and seems to have lost a good deal of its normal elasticity.

It is vaguely mentioned in the handbooks that in argyria the tissues are impregnated with the silver. This statement is so very ambiguous that I resolved to qualify it, and accordingly I cut a few small particles out of the conjunctiva. I naturally expected to find the staining in the epithelium. In the dead tissue nitrate of silver is *the* mode of staining the cementing substance between the epithelium cells. However, in my specimens there was no trace of any colour to be seen in the epithelium at all; the colouring was completely and exclusively confined to the elastic fibres. These latter were stained a deep brownish black to perfection, which in preparations obtained by teasing gave the most elegant and pretty pictures. No other tissue was affected by the silver; the elastic fibres were thus all the more conspicuous. I was surprised to find them in such great quantities.

Fig. 1 gives a picture of a more isolated heap of fibres. In some parts solitary and agglomerated grains

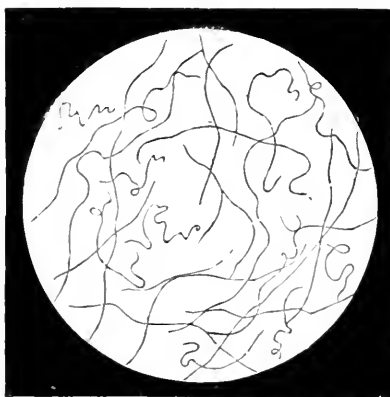


FIG. 1.

of a deep black pigment were visible. In trying to get at the nature of this pigment, I found, in searching with immersion lenses through several preparations, that these grains of pigment were nothing else but old elastic fibres, stained and broken up into a granular detritus. This was made evident by fibres

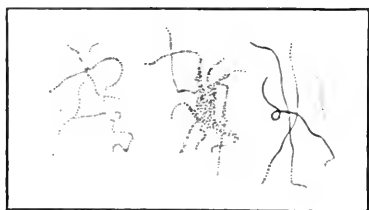


FIG. 2.

which appeared in their usual capricious curves but broken up into a row of fine roundish dots, like beads or bacteria. In some cases the fibres were broken up at the ends only ; in others, the whole length was dotted. There were other parts, again, which consisted of agglomerations of black pigment and broken up fibres. (Fig. 2.)

Transverse sections made from hardened bits of conjunctiva show that the elastic fibres form a stratum situated immediately below the epithelium, and about double the thickness of the latter.

It is interesting to note that the elastic fibres decay by being transformed into beads in a manner which reminds us of their development. The thickening of the conjunctiva and its apparent loss of elasticity are readily explained in our case by the microscopic appearances.

GOWERS (London). **A Manual of Diseases of the Nervous System.** 2 Vols. pp. 463 and 975, 8vo. *J. and A. Churchill, London, 1886-88.*

FIRST NOTICE.

In his preface to the first volume of his manual, which appeared two years ago, Dr. Gowers says: "This volume contains the first part of an attempt to give an account of the diseases of the nervous system, sufficiently concise to be within the compass of the time-pressed student or busy practitioner, and yet adequate in its outline of a subject which has become wide and deep beyond any other part of medicine. Success in both aims can scarcely be more than approximate." We did not review the first volume of the work, as it contains but little of direct ophthalmological interest; but the second volume has now appeared, and we can now form an estimate of the work as a whole. In preparing a student's text-book, Dr. Gowers' success has been, as he says only approximate; and we are not sorry that it is so, as a complete success in that direction would have implied a failure in what must be the main object of a special work such as this; namely, to present an adequate account of a department which has made more rapid progress, both in its scientific basis and its practical applications, than any other portion of medicine.

In reviewing the work, it is difficult to avoid falling continually into the language of indiscriminate praise. We shall endeavour, however, to indicate both the points of special excellence in the work and the points where we venture to think error has crept in; and it will be remembered that, in addition to these, there is the great body of the work, which is characterised throughout by such accuracy and completeness of clinical detail, by such clearness and conciseness of diction, and, perhaps not least, by such a wealth of admirable illustrations, as render the work one of the most notable that has issued from the medical press during the present generation.

The first volume deals with diseases of the spinal cord

and nerves, excluding the cranial nerves, and contains but little of direct interest to the ophthalmic surgeon, who may, perhaps, on this subject be more inclined to trust to Dr. Gowers' work on the "Diagnosis of Diseases of the Spinal Cord." He will do well, however, to read the account of locomotor ataxy, which constitutes what is practically a monograph of forty pages. Dr. Gowers' statements as to the course and termination of the disease are of especial value, as the ophthalmic surgeon not unfrequently, from pupillary or optic nerve symptoms, detects the disease in an early stage. "The course of the symptoms is extremely variable. The epithet 'progressive' given to the malady by Duchenne expresses a characteristic of a large proportion of the cases in which ataxy is developed, and he knew no other cases of the disease. But the power of recognising the first (*i.e.*, the *præ*-ataxic) stage of the disease, which we owe, especially, to Westphal's discovery of the loss of the knee-jerk, has enlarged, and, in enlarging, has to some extent modified our conception of the general tendency of the disease. It is exceedingly common for the first stage to remain stationary for a long time—for ten, twenty, and even in one case for twenty-five years—if the duration of the lightning pains may be accepted as proof of its existence. When all cases are taken together and patients are subjected to careful treatment, I do not think that the disease shows a progressive tendency in more than one half of the cases." Again he states: "Atrophy of the optic nerve does not occur in more than one case in ten. It is generally an early symptom, usually commencing before inco-ordination is developed, and in a large number of cases ataxy never comes on, the spinal malady becoming stationary when the nerve suffers. It rarely begins after the gait is considerably disordered."

The second volume is devoted to "Diseases of the Brain and Cranial Nerves, and the General and Functional Diseases of the Nervous System," and a large part of it is of the utmost importance to the ophthalmic surgeon. It commences with an admirable account of the structure and functions of the brain, nowhere equalled in clearness, so far as we are aware, except in the same author's "Diagnosis of Diseases of the Brain." Dr. Gowers does good service in

calling attention to an ambiguity in nomenclature of considerable importance at the present time. He shows that the term "angular gyrus" is used in three senses: First, as meaning the whole region from the end of the fissure of Sylvius to the occipital lobe; second, as the posterior two-thirds of this region, surrounding the posterior termination of the parallel fissure, which is its usual signification; and, third, as the posterior third of the region between the termination of the Sylvian fissure and the occipital lobe. It is even occasionally used as synonymous with the French term "*pli courbe*," which includes the whole of the convolution bounded above by the intraparietal fissure. By the way, we must dissent from Dr. Gowers' use of the term "interparietal," in place of the correct "intraparietal."

The section on the cortical centres in the human brain is a model of what we might term negative statement, showing the limits of our actual knowledge: where it is vague and wanting in definition, where inference has been accepted in place of demonstration, and where we know absolutely nothing. With regard to the visual centre, he says: "Numerous observations have established beyond question the fact that hemianopia results from disease of the occipital lobe, which thus constitutes a centre for the fibres from the same-named half of each retina, and receives impressions from the opposite half of each field of vision. Complete hemianopia has most frequently been produced by disease of the apex of the lobe, and especially of the cuneus." He believes, however, that, in addition to this half-field visual centre, there is in front of the occipital lobe a higher visual centre, in which the half-fields are combined and the whole opposite field is represented. Such a centre he believes to be localised in the angular gyrus, basing his belief first on the cases of "crossed amblyopia" where post-mortem evidence has shown this region to be affected, and also on the experiments recorded by Ferrier. The question may be regarded as at the present moment *sub judice*, and important papers on the subject will be found in "Brain," Part XLI., just published. Except on some such assumption, it seems very difficult to explain the case recorded by Sharkey and quoted by Gowers, where an embolism of the right middle cerebral

artery caused left hemiplegia and hemianæsthesia, with almost complete blindness of the left eye and loss of hearing and taste on the left side. The crossed amblyopia is usually accompanied by concentric contraction of the field of vision of that eye, and also by a slight contraction of the field on the side of the lesion; as if both fields were represented in this higher centre, but the opposite field in far higher degree than the field on the same side—a theory which goes far to explain the transiency of crossed amblyopia, as compared with the permanence of hemianopia.

He takes up this subject again under the head of the optic nerve and visual symptoms, and gives an account (1) of the varieties of hemianopia and their diagnosis; (2) of colour hemianopia, which seems to imply a separate half-vision centre for colour, apart from form, as Wilbrand holds; (3) of crossed amblyopia; and (4) lastly, of “mind-blindness.” This last was the term given by Munk to the condition which he produced in dogs by extirpating parts of the occipital lobes. The animals could apparently see, but they did not recognize the objects before them. This condition has occurred in man, and is due probably to a bilateral lesion in front of the occipital lobe, perhaps in the posterior part of the parietal lobes, where the area concerned in word-blindness is situated. The whole account of the diseases of the visual system, both organic and functional, will well repay a careful perusal.

The course of the fibres in the pons and medulla is a kind of *bête noire*, and the best possible exposition cannot make it anything but an extremely complex subject. The account given by Gowers can, with the help of the numerous and excellent illustrations, be followed with comparative ease. It represents an enormous amount of labour, for the results have been culled from many sources, sifted and sorted with a sagacity and care which will make it of the greatest value to all future observers. And the same may be said as to his account of the origin of the cranial nerves. Nothing better, probably, has ever been designed in the way of a comprehensive and useful diagram than that on p. 49, showing the relations of the fields of vision, retinae and optic tracts. It will be noted that, throughout the work, Gowers

avoids as far as possible the use of a Latin nomenclature. This has its good side, but we sympathize with our German and French *confrères*, who will frequently fail to recognize old friends under what to them is a new name. Science, and perhaps specially neurology, is so cosmopolitan that we should probably gain all round by adopting the classical nomenclature throughout. May we note here that Gowers persistently misspells, as Betcherew, the name of one to whom he, along with others, is deeply indebted in all questions as to the course of fibres in the pons and medulla—Professor Bechterew, of Kasan.

The account given by Gowers of the symptoms of brain-disease on the motor, sensory, and mental sides would, we think, have gained in clearness and precision by a more explicit recognition of the distinction between epileptic and epileptiform seizures, which it is the great merit of Hughlings Jackson to have laid down. The distinction is a fundamental one of great practical importance, and should have been emphasized especially for those not acquainted with Dr. Jackson's original writings. And not only is the distinction of immediate practical importance, which Gowers, indeed, to a certain extent recognizes, but the theoretical considerations based by Hughlings Jackson upon it throw much light on the highest cerebral centres, and form the "working hypothesis" which at present holds the field, and without which epilepsy proper, as well as a great part of the nervous phenomena of health and disease, would be simply a chaos of symptoms.

Dr. Gowers has evidently taken very great pains with the section on the motor nerves of the eyeball, but we venture to think that it is the most unsatisfactory part of the work. In the diagrams of the paralyses of individual muscles, he *represents*, instead of *projecting*, the motor field. The mind and eye have got so accustomed to the projection of the visual fields that it is difficult to avoid confusion in looking at his motor fields. The difficulty is indeed so great that Dr. Gowers has himself been unable to avoid it, and, in his account of the paralysis of the internal rectus on p. 167, he puts *right* for *left* on two occasions, and he also speaks of the images diverging *towards* in place of *from* the

horizontal plane. On p. 48 a slip occurs, the superior oblique being made to derive its supply from the third nerve. This slip vitiates also the remark as to the contiguity of the centres for associated muscles, for, according to Hensen and Voelcker's scheme, the centre for the inferior oblique would separate those for the inferior rectus and superior oblique. With regard to Dr. Gowers' account of the difficult subject of the paralyses of the oblique muscles, we confess to being quite unable to follow him. For example, referring to the paralysis of the superior oblique, he says: "Defect of movement downwards and inwards, since in this position the muscle is a depressor. Strabismus exists only below the horizontal plane, and is convergent." The first sentence seems to us a *non sequitur*, and the second does not agree with the first. We have been accustomed to think that the defect of movement in paralysis of the superior oblique, when any defect at all is perceptible, is downward and *outward*, and that the inward tendency of the eye sometimes visible in such cases below the horizontal is explained by the unopposed action of the inferior rectus. We quite admit that the superior oblique is a depressor of the eyeball in the adducted position, but this is not the question, which is, What movement is defective when the superior oblique is paralysed, and what effect will this have on the projection of the visual field? The same difficulty enters into the account of the paralysis of the inferior oblique.

We have now noticed the more purely ophthalmological part of the work, and shall devote our next notice to the remaining portion.

J. A.

VON HIPPEL (Giessen). A New Method of Corneal Transplantation. *Archiv. für Ophthalm.*, XXXVII. 1, p. 108.

A. WAGENMANN (Gottingen). Experiments concerning Corneal Transplantation. *The same*, p. 211.

At the meetings of the Ophthalmological Society in Heidelberg in 1886 and 1887, Von Hippel described a new method by which he had succeeded in transplanting a portion of the cornea of a rabbit into a human eye, with permanent retention of its transparency. In the present paper he resumes the subject, and describes his experience in detail.

In the first place it may be noted that the unfavourable conclusions published in 1880 by Neelsen and Angelucci, which appeared finally to dispose of corneal transplantations as physiologically impossible, are refuted. These experimenters summarised their experience as follows:—"In the majority of cases a portion of the corneal graft perishes; the rest is enclosed in opaque cicatricial tissue. Union, with preservation of the graft, is possible only when the graft is nourished not through its margin alone, but through its inner surface by contact with pre-existing or newly-formed tissue; when healing is completed there is then an opaque layer on the inner surface of the graft." In opposition to the foregoing, it has been amply proved, with regard to the leucomatous human eye, firstly, that it is the exception for the graft to perish; and, secondly, that marginal nutrition of the graft suffices for its preservation, contact of its posterior surface with other tissues being both unnecessary and undesirable, inasmuch as it annihilates the optical result; but on the other hand it appears that even in the absence of posterior adhesions with the iris, etc., the graft soon loses its transparency through swelling of its tissue and loss of its epithelium.

Undeterred by the failures which had attended every method yet attempted, Von Hippel addressed himself to the question: Why does the corneal graft, even when smoothly healed in its new situation, so speedily become opaque? He

found the answer in the fact discovered by Leber, that the transparency of the cornea depends upon the integrity of the epithelium lining Descemet's membrane. Disturbance of the latter leads to swelling and opacity of the subjacent corneal tissue and casting off of the anterior epithelium, through entrance of the aqueous humour. When the defect in the epithelium heals, the corneal changes subside ; so long as it persists, corneal opacity remains. After transplantation of the cornea the edges of Descemet's membrane are never found properly united ; the elasticity of the membrane causes them to roll inwards away from each other. The aqueous humour being thus admitted, the graft swells from its margin towards the centre and loses its transparency.

Guided by this consideration, and seeing that the influence of the aqueous humour could only be excluded by preserving Descemet's membrane, Von Hippel abandoned the idea of replacing the whole thickness of the cornea by transplantation, and reverted to that of a partial transplantation in which a portion only of the thickness of the cornea should be removed. This method, previously proposed and carried into effect by others, Von Hippel has improved and practised with encouraging success.

The first three trials failed through a fault in the method. With a special trephine he removed from the leucomatous cornea a circular piece about 1 mm. thick, without perforating Descemet's membrane ; with the same instrument he then removed from the cornea of a dog a piece similar in size and thickness. In all three cases the graft united readily, but became cloudy the next day, and opaque after a few weeks. The influence of the aqueous being excluded here, the opacity appeared to be the result of a traumatic keratitis—of damage done to the graft in dissecting it up from the eye of the dog. Von Hippel therefore decided to take the graft from a smaller animal, so that the entire thickness of the cornea might be employed. Success crowned the experiment and confirmed the supposition on which it was based. The patient was exhibited at the Heidelberg meeting.

The steps of the operation are as follows:—1. Cocaine. Chloroform is objectionable on account of the risk of vomiting. The lids being separated and the globe fixed with

conjunctival forceps on the inner and outer sides, the trephine is applied quite vertically to the surface of the leucoma. The trephine recommended is of special construction; it rotates automatically by means of a spring, and demands a minimum pressure on the cornea; its cutting edge is 4 mm. in diameter; larger diameters are undesirable, as increasing the difficulties of smooth healing and exposing too large an area of the thin Descemet's membrane. More or less bleeding from minute vessels in the leucoma always follows the use of the trephine; it is best arrested by pressure with small pledgets of cotton wool dipped in sublimate solution and cooled on ice. 2. The trephined portion is dissected off with the help of strong toothed iris forceps and a Graefe knife. This is the most delicate step in the operation. The end to be aimed at is the removal of a disc of equal thickness throughout, leaving the cut margin vertical and equally deep at all parts of the circle, and retaining as thin a layer as possible of the corneal tissue. The difficulty of this step is increased by the bleeding which follows each touch of the knife; the assistant checks this by applying small pledgets of wool as above described. When the dissection is complete the eye is washed with sublimate solution, closed, and gently compressed in order to arrest all bleeding. 3. With the same trephine, adjusted to cut rather more deeply, a circular piece is removed from the cornea of a young rabbit under the influence of cocaine. (What objection is there to killing the rabbit immediately before operating upon it?) This step also appears to present considerable difficulty; simple fixation with forceps gives insufficient steadiness to the eye. A squint hook passed behind the globe and pressing it forwards answers better, or perhaps it would be better still to excise the eye and fix it in a suitable support. 4. The prepared graft is laid upon the surface of the patient's eye, close to the trephined area, and then gently slid into place, avoiding the entrance of air bubbles between the two surfaces. It is gently pressed down with the spatula, so that it lies evenly in its place. If its surface is a little below that of the cornea no harm follows, but if it protrudes from it the graft is apt to be displaced afterwards. The eye is dusted with iodoform, the lids are carefully closed, and both eyes

are covered with a firm pressure bandage which should remain undisturbed until the second or third day, after which it may be changed every twenty-four hours.

After giving some further details of the difficulties of the operation, Von Hippel describes the after progress as observed in eight cases. Four cases failed ; three of them through faults in the operation, which experience will obviate, the other through bad conduct on the patient's part after the operation. Twenty-four hours after a successful transplantation there is moderate conjunctival and ciliary injection ; the leucoma displays numerous vessels, previously invisible, reaching the margin of the graft, and the tissue here is grey, swollen, and raised above that of the graft. The graft remains transparent, or becomes slightly cloudy without losing its polish. The injection disappears in the course of a week. The groove between the leucoma and the graft is annihilated by extension of epithelium from the former. Healing appears to be complete at the end of the third week.

The improvement in vision in the patient exhibited at Heidelberg was from counting fingers at 2 metres to $\frac{20}{200}$. Such improvement can only be expected in cases of leucoma not involving the whole thickness of the cornea, for if opaque tissue is left behind by the trephine, it becomes even more opaque as union with the graft takes place ; but even in this case the opacity may be partially removed later on, and the result of the operation may still be an improvement of vision.

The operation is impracticable in cases of adherent and bulging leucoma.

Wagenmann, in the second paper referred to above, records a series of experimental operations on rabbits, undertaken with the object of determining the physiological possibility or impossibility of corneal transplantation by various methods. Having given the history of the various attempts made during the last seventy years, he summarises the present position of the subject as follows :—Transplantation of a graft which includes the whole thickness of the cornea into a corresponding gap in the cornea of another eye

has hitherto proved unsuccessful both in animals and man. It is quite possible to obtain union of the graft, but not to maintain its transparency. On the other hand, good results are obtainable in suitable cases by the method of partial transplantation lately carried out by Von Hippel; but the number of cases suitable for this method is small, and in some of them a fairly satisfactory visual result is obtainable by the simpler and safer operation of iridectomy. Von Hippel's results with partial transplantation have at least refuted some of the assertions of the opponents of this operation, and thrown doubt on others; but the results of the partial have little bearing on the total operation, for the opening of the anterior chamber constitutes an essential difference between the two methods.

The crucial question is, Whether it is possible to implant a graft in a corresponding gap which involves the whole thickness of the cornea, and to retain a portion of it at least in a transparent state? In order to simplify the problem as much as possible, Wagenmann determined first to ascertain whether a portion of cornea removed in its entire thickness can be successfully replaced *in the same eye*.

He experimented on rabbits under the influence of cocaine. Disinfection was effected by sublimate solution. For the protection and fixation of the graft various methods were employed, *e.g.*, drawing over it the nictitating membrane; covering it with a large conjunctival flap; drawing across it, without any dissection, the loose conjunctiva from above and below the cornea; and respectively fixing these coverings with sutures. In like manner protection of the eye was effected by closing the lids in various ways, and in some cases no protection was employed. The Graefe knife was used in place of the trephine and the portions of cornea detached were of considerable size—in some cases as much as 8 mm. by 7 mm., and of irregular oval form.

In the first experiment the flap was not completely detached, but a small bridge, consisting only of the anterior layers of the cornea, was left undivided at each end of the oval. This was done for the sake of fixation. Good union was obtained. Proceeding a step further, one small bridge only was left in the next case. Here also good union with

retention of transparency was obtained ; on the fourth day the anterior chamber was re-established, and only some small adhesions between the iris and the wound remained. Seeing that the bridge left undivided was much too small to have played any important part in the nutrition of the flap, the author holds that, as regards nutrition, the condition of things was essentially the same as though the flap had been completely separated ; on the other hand, as regards fixation, the bridge constitutes a great difference.

He next proceeded to experiment with a completely separated flap. Forming one half of the flap first, he fixed this in position with sutures before separating the other half ; the second half was then separated and sutured in like manner. Even with this precaution, which, of course, could have no parallel in the case of a transplantation from one eye to another, the difficulties of fixing the graft in proper position were very great. Out of nine cases two were successful, and a third partly so. Union took place by the cementing together of the edges by a fibrinous exudation, which was transformed later into a firm cicatrix. After about the sixth day a few small vessels were visible in the cornea external to the cicatrix ; they did not enter the cicatrix and were not primarily concerned in the union of the flap. Prolapse of the iris did not occur in the successful cases, but there was broad synechia leading to secondary glaucoma with more or less staphyloma of the globe.

By these experiments Wagenmann claims to have proved that a portion of the cornea separated in its entire thickness may, when re-applied in its original position in the same eye, re-unite and retain its transparency. He does not claim that his results can be turned to account in the surgery of the human eye, but lays stress on the great difficulty which the fixation of such grafts involves.

In conclusion, he discusses the causes which lead to the opacity of the graft in cases of total transplantation. As before stated, Von Hippel refers this to the action of the aqueous humour, and considers it inevitable in cases of total transplantation, because a gap remains in Descemet's membrane. Wagenmann repeated Leber's experiments with regard to the influence of the epithelium in preventing the

entrance of the aqueous into the substance of the cornea, and obtained the same results ; but, while agreeing with Von Hippel that the exclusion of the aqueous is essential, he shows that this is not so unattainable in a total transplantation as Von Hippel assumes. Although the gap in Descemet's membrane does not close, it is bridged over by newly-formed epithelium, as indeed occurs when this membrane is destroyed by perforating ulcers ; and the fact that in these latter cases the whole cornea does not become opaque proves that a gap in Descemet's membrane does not preclude the retention of transparency. In order to test the influence of the posterior epithelium in transplantation cases, Wagenmann scraped it away from the flap in some of his experiments ; the flap healed as in other cases, but become opaque.

He concludes that the opacity hitherto met with in total transplantation, so far as it is not due to infective processes, is caused by disturbance of the posterior epithelium in manipulating the graft ; he points out also that a large graft would be more favourable than a small one, inasmuch as the inevitable marginal opacity would have less tendency to reach the centre. The final inference is that the utmost gentleness in dealing with the graft is essential to success, and he concludes by expressing a doubt whether, in face of the great difficulties which beset it, the operation of total transplantation will ever become a practically useful one.

P. S.

GAYET (Lyon). Experimental Researches on Ocular Antisepsis and Asepsis. *Arch. d'Ophthal., &c.*—Oct., 1887.

Gayet introduces his subject by remarking that in the present state of our knowledge regarding the life-history of micro-organisms and their action upon wounds, it behoves the surgeon to thoroughly explore his territory ; to seek out the microbes which may be there present, to ascertain how they came there, how they can best be driven out, and, above all, whether any or all of them possess pathogenic properties. He naively adds that a series of 100 consecutive extractions

of cataract without a single case of phlegmon, which, judging by the reports in the medical journals, is familiar to many of his *confrères*, is to him still an ideal. In an attempt to discover the cause of his "inferiority" he was unable to attach blame to his method of operating, and therefore concluded to carefully examine his "operative territory." This he has done most exhaustively, and with an infinite amount of labour, as shown by this record, which is well worth perusal.

The plan of procedure was as follows:—The eyes of the patient about to be operated upon were washed several times with a solution of perchloride of mercury $\frac{1}{60000}$, or a saturated solution of boric acid, and "antiseptic" compresses applied. Special attention was paid to the lacrimal passages. Immediately before making the section for extraction, a sterilised platinumöse was passed beneath the upper lid, where a certain amount of conjunctival secretion adhered to it; a tube of sterilised gelatine was inoculated with this, then hermetically sealed, and kept in an incubator at a temperature of 32° — 36° C.

In the first series of 178 cases there were:—Males, 94; females, 81; sex not mentioned, 3. And of these 139 tubes were fertile, 39 (or 28 per cent.) sterile. A marked but unexplained difference existed in the two sexes. Thus of the tubes inoculated from the eyes of male patients 16 per cent., while of those from female patients, 38 per cent. proved sterile. Age appeared to exercise little, if any, influence.

As regards the operative results of these cases, records of only 157 were forthcoming. Of these 107 were completely successful, 39 moderately so, while 11 eyes were lost from "suppurative or plastic" inflammation, of which six were in male and five in female patients.

Referring again to the influence of age, these 11 patients were all over 50, and the percentage was highest in those between 60 and 70.

In a second series of cases, 35 in number, 32 tubes became fertile—a much larger proportion than in the foregoing.

This second series brought the total number of cases

experimented upon up to 213, with 171 fertile inoculations and 42 sterile. Of the total, 134 were completely successful, 42 moderately successful, and 13 lost by suppuration. In other words, of the 213 cases, in 171 the conjunctival sac was the home of germs capable of cultivation in suitable media, and yet in only 13 did infection of the wound occur. Thus is presented a problem which it is most desirable to solve.

Thinking that the atmosphere of the hospital in which all these cases had been treated might be one of the influences at work, Gayet examined in the same way four patients (three peasants in a small village and one member of a religious sisterhood) and from all obtained micro-organisms, which grew readily on nutrient gelatine.

The remainder of Gayet's paper contains the account, very careful and thorough, of his investigation of the cultures obtained in the inoculated tubes, and includes their macroscopic and microscopic characters, as well as the results obtained by inoculation of rabbits' corneæ, and intravenous injection in rabbits. He also made experiments to ascertain if the conjunctiva of a healthy rabbit offered a suitable soil for the growth of the micro-organisms taken from the human conjunctiva, with an entirely satisfactory result—the organisms grew and multiplied. One series of experiments we may give in some detail.

Tube No. 155, inoculated on April 19th from the conjunctiva of a patient, proved fertile. On the 22nd some "bouillon" was inoculated from this tube, and on the 23rd this broth was used to inoculate a rabbit. A wound in the left cornea was made and a pipette containing a drop of the broth introduced into the anterior chamber. Next day there was purulent infiltration of the cornea. The right eye of the same rabbit was treated similarly, with a like result. A second rabbit was taken and its left eye inoculated with the same broth, with as a result immediate suppuration. The next day its right eye was similarly inoculated, but without result. Thinking the broth had become weak, a small quantity was injected into the vein of another rabbit, and the animal died in less than 24 hours.

The same broth was then used to inoculate six other

corneæ, at a day's interval, and all suppurated more or less completely. Thus 10 experimental inoculations were made in 10 successive days from broth containing cocci, developed from material furnished by the conjunctiva of a patient ; of these nine were infected ; one eye alone escaped, but the fluid showed its virulence at that time by rapidly killing a healthy rabbit. In the patient who furnished this poison suppuration came on 48 hours after operation, and the eye was lost.

The author's conclusions from his researches are :—

(1.) The majority of eyes contain microbes in the conjunctival sac, equally those of patients in and out of hospital.

(2.) The use of antiseptic and aseptic precautions appear to have but little influence on the presence of germs in the conjunctival cul-de-sac ; with whatever care they are used there is no certainty that these germs can be completely excluded.

(3.) The germs are of several kinds, and, without being able to state definitely all the varieties which may be present, it is at least certain that staphylococcus aureus, albus and citreus, and some forms of bacteria and bacilli are met with.

(4.) These germs are not all pathogenic ; the number of suppurations was only $6\frac{1}{2}$ per cent., while the soil was shown to be fertile in 75 per cent.

(5.) The micrococci may, but do not necessarily, include those dangerous to the operated eye ; varieties were isolated and cultivated which were incapable of setting up suppuration, when planted in a rabbit's cornea.

The evidence adduced by these experiments is strongly in favour of the opinion, which is steadily gaining the support of ophthalmic surgeons, that suppuration after operations upon the eye (and in this respect it differs in no way from other tissues and organs) is due to infection of the wound by pyogenic micro-organisms, and therefore should be classed as a preventable complication. There are so many labourers in the field now, that it is fair to hope that ere long we shall know how certainly to prevent such a lamentable occurrence.

J. B. L.

WEEKS(New York). Bacteriological Investigations of the Antiseptics used in Ophthalmology. *Arch. of Ophthal.* VII. 4, December, 1887.

In this valuable and very practical paper the author adds considerably to our knowledge of the power possessed by a large number of the drugs in common use as antiseptics to destroy the vitality of germs which may infect wounds. Of the numerous agents employed as antiseptics, only a few can be applied to the eye; the large majority are precluded by the irritation or inflammation of the conjunctiva which they set up when used in sufficiently strong solutions to be efficient germicides.

The time required by many to completely kill micro-organisms is a serious drawback; the difficulty, almost the impossibility, of keeping any antiseptic applications in contact with the conjunctiva and cornea is only too familiar to surgeons.

It is well known, from the investigations of the author and others (Sattler, Widmark, Fick), that the healthy conjunctival sac may contain and tolerate several varieties of microbes, which are harmless so long as there is no breach of the epithelial surface. Of these varieties staphylococcus pyogenes is occasionally though rarely met with. Weeks' experiments were made with it, and it is perhaps safe to assume that solutions of antiseptics which destroyed its vitality would be sufficiently powerful to cope with other and less dangerous forms.

The following are the agents which, according to the writer, may be used to the conjunctival surface without setting up troublesome irritation. We can give but a very brief notice of them, and must refer our readers who desire more information to the original article, which will repay perusal.

Bichloride of Mercury. A 1:4000 or 1:5000 solution in water. This destroys vitality of germs in $2\frac{1}{2}$ to 3 minutes.

Bisulphate of Mercury. 1:8000 destroys vitality in 4 minutes. It causes some smarting.

Nitrate of Silver is one of the most powerful germicides.

In solutions of 1:100 it destroys vitality in 12 seconds. Its lack of stability and its staining qualities unfit it for many purposes.

Chlorine Water, when freshly made, is about equal in germicidal properties to solutions of sublimate and the nitrate of silver. It is, however, very unstable, and, unless fresh, of very little use.

Boric Acid, in powder or saturated solution, has, Weeks considers, no germicidal effect whatever. It is said by Sternberg and others to arrest development of, but not to kill, germs present in the solution.

Calomel in powder destroys vitality in 3 minutes.

Iodoform retards development, but does not kill.

Not the least instructive part of Weeks' paper is that which deals with the sterilizing of instruments. This he classes under the heads of: (1) *Mechanical*, (2) *Chemical*, (3) *Thermal*.

(1) As moisture is essential for the development of germs, perfectly dry clean linen may be used for the cleansing of instruments, without fear, provided that the surface of the steel be smooth. This method is safe only when this condition obtains; the minutest roughness on the surface of the steel may harbour germs, which the most careful rubbing will fail to dislodge.

(2) For the *chemical sterilization* of instruments the greater number of efficient antiseptic solutions are objectionable, in that they dull the cutting edge. Those which may be safely used are solutions of bichloride of mercury, 1:2000, in which the instruments must not be left for more than one to two minutes; carbolic acid, 1:20 or 1:40, the latter requiring 4 to 5 minutes' exposure; salicylic acid, 1:600 or 1:1000, in which the instruments should lie for five to ten minutes.

(3) Dry or moist heat may be employed, but the author much prefers the latter, and recommends, as best, water at a temperature of 90° to 100° C. This destroys the vitality of all pyogenic and nearly all pathogenic germs in two or three minutes.

"*Mechanical* combined with *thermal* sterilization in the use of hot water is, to quote the author's words, the best

method. As, however, the procuring of hot water is attended with some degree of trouble, and as a solution which can always be kept ready is more convenient, the combination of the mechanical with the chemical will probably be most used. The water should be previously boiled, and the antiseptic employed be either bichloride of mercury, carbolic or salicylic acid. These act promptly, and are efficient."

J. B. L.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

THURSDAY, MAY 3RD, 1888.

J. W. HULKE, F.R.S., President, in the Chair.

Reported by JOHN ABERCROMBIE, M.D.

Melanotic Sarcoma.—Mr. C. Higgins gave an account of a case of this affection. The chief point of interest was that the appearance of the growth simulated to such an extent an opaque and displaced lens as to be taken for this by more than one of those who examined it. The eyeball was eventually excised, and found to contain a mass of melanotic sarcoma. The patient died with a greatly enlarged liver seven months after the removal of the eyeball.

A Point in Connection with Artificial Eyes.—Mr. McHardy pointed out that a sinister appearance almost invariably associated with the wearing of an artificial eye was very largely, if not indeed entirely, obviated when such a patient wore spectacles or eyeglasses with odd lenses, so that the lens in front of the artificial eye had something like 3 D greater refracting power than that before the natural eye. The extra lens power before the artificial eye produced an optical delusion regarding the level and size of the latter; and the excess of lens power, which usually was about 3 D, could be varied according to the distance at which the lens was placed in front of the artificial eye.

Mr. Tweedy thought there was nothing new in the suggestion; he had adopted the practice for many years, and believed he owed the idea to Mr. Lawson.

Primary Tuberculosis of the Choroid.—Mr. McHardy read the notes of a case of local tubercular choroiditis occurring in a female child aged 6, with negative family history. The only point of importance in the history of the case was an attack of ascites without obvious cause, some weeks previously, from which the child had completely recovered. He closely watched the intra-ocular condition during four weeks, and then enucleated. The constitutional symptoms which had preceded enucleation immediately subsided after removal of the eye, and had not returned in the five months that had since elapsed. The specimen showed that complete detachment of the retina had occurred at the time of enucleation; that the main intra-ocular tumour was in the choroid, and that the two smaller masses in the retina were all definitely tubercular so far as the microscopical appearances without the presence of bacilli would reveal. He regretted that inoculation had not been practised, urged the importance of early enucleation in analogous cases, and remarked that the literature of the subject pointed to the infrequency of local intra-ocular tuberculosis, to the not invariable, but very usual, failure to find the Koch bacillus therein, and that successful tubercular inoculation from such masses had been effected even when the Koch bacillus had eluded detection.

Mr. J. W. Hulke did not remember to have seen a single instance of primary tubercle of the choroid.

Dr. Hill Griffith asked how it was proved that the growth was not a sarcoma? He had enucleated an eyeball for sarcoma, and found a detachment of the retina which was not present immediately before the enucleation. The improvement in the constitutional state might have been the result of the relief from pain.

Dr. Sharkey thought that the diagnosis of *primary* tuberculosis of the choroid could not be sustained in this case without further history. It was a well recognised fact that tubercular peritonitis was frequently cured, attested both by clinical and pathological evidence, the latter being extremely strong. It was much more likely that this was a case of tuberculosis of the peritoneum and subsequently of the choroid.

Mr. Carless described the methods of staining adopted

in the search for bacilli, and alluded to some points in the clinical history of the abdominal ailment.

Mr. McHardy, in reply, pointed out that the appearances did not at all agree with those seen in sarcoma. There was no pain about the eye, but the tumour grew very rapidly, and hence probably the relief of the symptoms after the enucleation. He quite agreed that there was a doubt as to the nature of the original abdominal affection.

Functional Eye Symptoms in Hysteria and Allied Conditions.—Dr. Hill Griffith read an abstract of a paper on the above. He classified the cases into the following groups: 1. Hysterical blindness, mostly monocular; 2. Amblyopia of one eye, with achromatopsia and hemianæsthesia (Charcot); 3. Same Group with absence of hemianæsthesia; 4. Blepharospasm as sole eye symptom. This symptom was common in all the groups; 5. Hysterical conjugate deviation of eyes; 6. Neurasthenic asthenopia, symptoms bilateral. He was in favour of the theory of changes in the centres of vision rather than in the retina, as the cause of contraction of the field of vision.

Mr. Jessop asked if he had met with the concentric spiral cases described by Mr. Priestley Smith, in which it had been shown that a neutral tinted glass enlarged the field. He asked if any change had been noted in the ordinary fields, that is, in relation of green to white, etc.

Mr. Ernest Clarke objected to all the cases being grouped under one heading, some being evidently due to fraud, others to true hysteria, and others possibly were central.

Dr. Griffith agreed that the fields of vision were always affected. He thought it was difficult to draw the line between fraud and self-deception.

On the Removal of Staphyloma of the Cornea.—Mr. Tatham Thompson read a paper recommending that a curved needle threaded with horsehair should be passed through that portion of the staphyloma which it was intended to remove; it afforded a ready means of steadying the eye whilst the elliptical incisions were being made, and of removing the portion after they were completed. The edges of the wound usually adapted themselves readily: the

parts were then well flushed with a weak solution of perchloride of mercury, and tolerably firm pressure applied to keep them in apposition. The results obtained were very satisfactory.

Specimens.—The following card and living specimens were shown :—Dr. W. J. Collins : Photographs and Drawings of some Rare Affections of the Eyelids : 1, Spontaneous Symmetrical Œdema of both Eyelids in a Boy, without obvious cause, of rapid onset and slow subsidence ; 2, Spurious Ptosis due to Paralysis of Frontalis Muscle on one Side ; 3, Bilateral Hysterical Ptosis. Mr. S. H. A. Stephenson : Case of Double Optic Neuritis after Measles. Mr. J. B. Lawford : Pathological Specimens : 1, Pigmentation of Retina chiefly along the Larger Vessels ; 2, Colouring Matter (? Blood Pigment) in Cornea ; 3, New Tissue Formation in Choroid. Mr. Brailey : 1, Case of Destructive Ulceration of Eyelid in an Infant, probably Syphilitic ; 2, Case of Ripple-like Detachment of the Retina. Mr. Jessop : New Form of Stereoscope.

RECENT LITERATURE.

A. RETINA. OPTIC NERVE. CENTRES.

ALLEMAN. The papillitis of sunstroke.

N.Y. Med. Jour., May 5th, 1888.

BADAL. Contribution à l'étude des cécités psychiques ; alexie, agraphie, hémianopsie inférieure, trouble du sens de l'espace.

Arch. d'Ophtal., VIII. 2, p. 97.

CHAUFFARD. De la cécité subite par les lésions combinées des deux lobes occipitaux (anopsie corticale).

Recueil d'Ophtal., March, 1888.

GALEZOWSKI. De la curabilité du décollement de la rétine et de son traitement par l'aspiration du liquide sous-rétinien.

Recueil d'Ophtalmol., March, 1888.

SCHÄFER. Experiments on the electrical excitation of the visual area of the cerebral cortex in the monkey.

Brain, Part XLI., April, 1888.

VALUDE. l'Erythroopsie.

Arch. d'Ophtal., VIII. 2, p. 130.

B. UVEAL TRACT. VITREOUS AND AQUEOUS. LENS.

BOCK. Pigmentklümpchen in der Vorderkammer, frei beweglich. Anatomische Untersuchung des ganzen Augapfels.

Klin. Mon.-Bl. f. Augenheilk., April, 1888.

JACOBSON, SEN. Beitrag zur Glaucomlehre.

Arch. für Ophtal., XXXVII. 1, p. 169.

HIGGINS. On extraction of immature cataract.

Lancet, May 12th, 1888.

LAPERSONNE. Colobome irien et choroïdite maculaire.

Arch. d'Ophtal., VIII. 2, p. 118.

TWEELY. On extraction of immature cataract.

Lancet, May 19th, 1888.

C. CORNEA. CONJUNCTIVA. SCLERA.

EMMERT. Frühjahrskatarrh.

Centralbl. f. prakt. Augenheilk., March, 1888.

FEILCHENFELD. Pigmentloses Sarcom der Conjunctiva palpebrarum.

Centralbl. f. prakt. Augenheilk., April, 1888.

GOLDZIEHR. Über eine durch syphilis bedingte Form der Conjunctivitis granulosa.

Centralbl. f. prakt. Augenheilk., April, 1888.

MANZ. Über die Hornhautzerstörung bei Sepsis.

Münch. Med. Woch., Nos. 11 and 12, 1888.

PARISOTTI. Kératotomie et paracentèse dans les kératites suppurantes.

Rec. d'Ophtal., March, 1888.

STRAUB. Fluorescinslösung als ein diagnostisches Hilfsmittel für Hornhauterkrankungen.

Centrl. f. prakt. Augenheilk., March, 1888.

D. ACCOMMODATION. REFRACTION. MOTOR APPARATUS.

BONGERS. Einfache Methode der Refractionsbestimmung im umgekehrten Bilde.

Klin. Monatsbl. f. Augenheilk., May, 1888.

HOSCH. Einseitige Accommodationsparese mit Mydriasis bei inveteriter Syphilis.

Corr. Bl. f. Schweizer Aertzte, 1888, No. 4.

MÜLLERHEIM. Ein Beitrag zur Lehre des Accommodations-Krampfes.

Inaug. Dissert., Berlin, 1888. G. Schade.

THOMAS, C. H. Graduated tenotomy in the treatment of the insufficiencies of the ocular muscles.

N.Y. Med. Jour., April 21st, 1888.

E. EYELIDS. LACRIMAL APPARATUS. ORBIT.

ADAMUK. Ueber eine merkwürdige Motilitats-Anomalie der Lider und Augen.

Kl. Monatsbl. f. Augenheilk., May, 1888.

GALEZOWSKI. Ophthalmoplegie du tabes.

Progrès Médical, 1888, No. 8.

HOTZ. Die Reposition des Lidrandes bei Trichiasis der oberen Lides.

Klin. Monatsbl. f. Augenheilk., March, 1888.

VAN MILLINGEN's operation for Entropion.

Brit. Med. Jour., May 19th, 1888, p. 1,074.

F. MISCELLANEOUS.

ALEXANDER. Erblindung nach Keuchhusten.

Deutsche Med. Woch., 1888. No. 11, p. 204.

ARMAIGNAC. Nouvelle pince pour l'extraction d'un lambeau de capsule antérieure dans l'opération de la cataracte.

Rec. d'Ophtal., March, 1888.

Annales du Laboratoire de l'hospice des Quinze-Vingts.
MM. Fieuzal et Haensell.

Tome I. Fascic I.

COHN. Ueber Photographiren des Auges.

Centralbl. f. prakt. Augenheilk., March, 1888.

DU BOIS-REYMOND. Ueber das Photographiren der Augen bei Magnesiumblitz.

Centralbl. f. prakt. Augenheilk., March, 1888.

ERNST. Ueber den Bacillus der Xerosis und seine Sporenbildung.

Zeitschr. f. Hygiene, 1888, No. II.

ON THE ESCAPE OF FLUID FROM THE AQUEOUS AND VITREOUS CHAMBERS UNDER DIFFERENT PRESSURES.

BY PRIESTLEY SMITH,

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BIRMINGHAM.

The manner in which the fluids of the eye enter, traverse, and escape from the aqueous and vitreous chambers has been the subject of much research and discussion during the last fifteen years, but our knowledge of the matter is still at some points incomplete. The experiments described in the present paper were undertaken in the hope of gaining information, firstly as to the amount of fluid which traverses the chambers in a given time, and secondly as to the variations of amount which are produced by variations of pressure in one or both chambers. I hoped also to get some new evidence as to the direction in which the fluid of the vitreous body escapes from the eye, a question which seems not yet quite satisfactorily answered. The whole subject has, of course, an especial importance in connection with the study of glaucoma; and, in view of the discussion which is to be held at the Heidelberg Congress in August next, it seems well to publish the main results of my experiments now, rather than to wait for further elaboration, especially as I have to modify certain conclusions published ten years ago.

Without attempting to review the whole literature of the subject, it will be necessary to refer briefly to the principal facts which have come to light during recent years, and to indicate the position in which our knowledge appears to stand at present.

Secretion of the Aqueous Fluid.—The aqueous fluid is secreted by the ciliary processes, and perhaps also to a small extent by the posterior surface of the iris. The part, if any, played by the iris is certainly of subordinate importance, for the iris may be atrophied or even entirely absent, without any discoverable deficiency in the intra-ocular fluids. With regard to this part of the subject, all observers, probably, are now agreed; the experiments of Deutschmann, Weiss, Knies, Ehrlich, Ulrich, Schœler, Ulthoff, Schick, Leplat, and others, although not altogether in agreement, appear to afford conclusive evidence as to the main fact. References and abstracts of some of the papers referred to may be found in the *Ophthalmic Review*, vol. i., pp. 149, 413; vol. iii., p. 90; vol. viii., p. 152.

Escape of the Aqueous Fluid.—The aqueous fluid escapes at the angle of the anterior chamber, by filtering through the ligamentum pectinatum into Schlemm's canal and the veins connected with it. With regard to this fact also, there is probably no difference of opinion; all subsequent observations have tended to confirm Leber's original discovery (Von Graefe's Archiv., 1873).

Nutrition of the Vitreous Body.—It is probable that the vitreous body receives its nutrient supply exclusively from the ciliary portion of the uveal tract. This is still, I believe, debatable ground. As an inference, drawn chiefly from anatomical and clinical study, the foregoing definition of the nutrition of the vitreous was put forward by myself in 1878, but it was not at that time supported by physiological experiments. (Glaucoma: Its Causes, &c. London: Churchill, p. 137.) The evidence in its favour is now much stronger and must be noticed here, for opinion is still divided with regard to it.

It is improbable, *à priori*, that a highly complex structure like the retina, consisting of many differentiated layers, and possessing an isolated vascular system of its own, should transmit the secretion of a distinct vascular tract situated on its one side to a structure with which

it has nothing in common, either structurally or by development, situated on its other side. Moreover, recent discoveries connected with the so-called visual purple, have shown that the chorio-capillaris and hexagonal epithelium have another secretory function, viz., the maintenance of the conditions upon which retinal sensibility depends. On the other hand, precisely at the anterior limit of the retina an intimate connection between the uveal tract and the vitreous, of a kind perfectly adapted for nutritive osmosis, begins. Studying the matter by the help of pathological anatomy, we find, in eyes excised during the first stage of inflammatory exudation into the vitreous body, that the exudation proceeds from the ciliary portion of the uveal tract, and that the region of its influx is limited posteriorly by the ora serrata. We find also that while a shrinking vitreous readily separates from the retina, it almost invariably retains its firm connection with the portion of the uveal tract immediately in front of the ora serrata; and that while its transparency and volume are not necessarily impaired even by very extensive atrophy of the choroid, disease of the ciliary processes invariably tends to its destruction. That morbid changes in the vitreous body can sometimes be traced to disease in the corresponding portion of the choroid is no proof that the former draws its normal nutrition from the latter; an extension of disease from the choroid, through the retina, into the vitreous, is a natural consequence of the contiguity of the structures.

These considerations afford a presumption against the supposed nutrition of the vitreous by the choroid; positive evidence in favour of its nutrition by the ciliary body has been obtained by various experiments. Deutschmann found that removal of the ciliary processes together with the iris, which can be done in the rabbit without loss of lens or vitreous and without causing inflammatory destruction of the eye, is followed by a total arrest of the secretion of the aqueous, and by atrophy

of the vitreous body and lens (*vide Ophthalmic Review*, 1882, p. 149). Schoeler and Uthoff, after subcutaneous injections of fluorescine, found, in addition to a speedy colouration of the aqueous fluid, a gradual colouration of the vitreous body, proceeding from the ciliary processes, and travelling backwards; they maintain that the ciliary processes and the posterior surface of the iris secrete a fluid which fills the aqueous chamber and nourishes the lens and vitreous (*vide Ophthalmic Review*, vol. i., p. 113). From experiments of a somewhat similar nature, Schick came to the conclusion that the nutrient fluid of the vitreous is derived from the ciliary body, not from the choroid through the retina (Von Græfe's Archiv., p. 135, 1885). Later still Leplat, by a novel and very delicate method of investigation—subcutaneous injection of iodide of potassium; enucleation after various intervals of time; division of the frozen eye-ball into zones; quantitative test of each zone for iodine by the starch method—has been able to demonstrate the source of the nutrient fluid of the vitreous in a very conclusive manner; he emphasises the statement that it proceeds from the ciliary body alone (*vide Ophthalmic Review*, March, 1888, p. 84).

Escape of Fluid from the Vitreous Body.—It appears to be proved that there is a current passing from before backwards through the vitreous body and an escape at the papilla; it remains uncertain whether there is, under normal circumstances, a current passing forwards through the circumlental space into the aqueous chamber. Speaking of the lymph passages within the sheath of the optic nerve, Schwalbe says, "They constitute a very complicated channel, which finds exit in the lymph spaces of the skull, and which conveys not only the lymph formed in the optic nerve, but that also of the retina and vitreous" (Græfe-Saemisch vol. i, p. 50). Stilling, also, has for years insisted that the fluid of the vitreous body, passing backwards along the central canal discovered by him, escapes at the papilla; he

states that, under artificial injection, an amount of fluid equal to three times the contents of the eyeball, will escape through the optic nerve and nerve-sheath of a young human eye in twenty-four hours ; he has suggested that closure of this posterior outlet is one of the causes of glaucoma (Report of Heidelberg Congress of 1885, p. 42).

In spite of the evidence put forward by these investigators it has been difficult to accept the view they advocate, for certain facts point the other way. Thus papillitis, with drepsey of the nerve sheath, a condition in which the lymph channels in the papilla are presumably much obstructed, is not commonly associated with any discoverable increase of ocular tension. Schœler found that artificial occlusion of the supposed posterior outlet caused no discoverable reduction in the amount of fluid escaping from the eye in a given time (Von Græfe's Archiv., xxv., iv.). More recently, in the experiments made by himself and Uhthoff, he failed to find any transit of fluorescine from the eyeball into the optic nerve or its sheaths. I myself, in 1878, injected solutions of carmine and of aniline purple into the vitreous of freshly excised pigs' eyes ; maintained the pressure for five or six hours ; then froze the eye and cut microscopic sections through the posterior pole ; there was no trace of colour deeper than the superficial layers of the retina. Again, I injected a coloured fluid into the sheath of the optic nerve, after ligaturing the nerve behind the point of injection ; the pressure employed was about double the normal intra-ocular pressure, and was maintained at this height during five hours ; microscopic sections of the nerve end and the adjacent part of the globe showed no trace of the fluid having entered the eye-ball, although the tissues were deeply stained up to the anterior extremity of the subvaginal space. The inference drawn from my experiments was expressed as follows :—"It is probable that the waste fluid of the vitreous body passes through

the suspensory ligament into the aqueous chamber, and forming part of the aqueous humour, escapes from the eye at the angle of the anterior chamber" (Glaucoma: Its Causes, &c., 1879, p. 142).

On the other hand the more recent experiments of Gifford and Leplat, tend to confirm the supposition that there is an escape at the papilla. Gifford injected, with special precautions, small quantities of water containing Indian ink or cinnabar in suspension into the vitreous of rabbits and other animals. The results were definite and constant. On the second day, or later, according as the injection was made farther backward or forward in the vitreous, the ophthalmoscope showed the particles collecting in the excavation of the papilla. On killing the animal a day or two later, the microscope showed the particles passing backwards through the papilla along the lymph spaces around the blood-vessels, leaving the nerve trunk with the vessels, and passing towards the sphenoidal fissure; they did not enter the sheath of the optic nerve; the current within this sheath was proved by other experiments to move from the brain towards the eye (*vide Ophthalmic Review*, vol. v.; ix., 217). Leplat's experiments, already referred to, appear to show that iodide of potassium injected subcutaneously enters the vitreous from the ciliary body, travels very slowly backwards, and leaves it at the papilla.

With regard, then, to the escape of fluid from the vitreous body, there is a remarkable conflict of evidence. On the whole it seems indubitable that there is an escape along the lymph spaces surrounding the central vessels of the papilla, but it seems probable that the amount of fluid escaping here is extremely small.

The experiments now to be described were made on the excised eyes of freshly killed pigs, oxen, and sheep. The latter were the most satisfactory, because I could obtain an ample supply of these and commence opera-

tions within a few minutes after the animals were killed. I shall, therefore, chiefly describe the results obtained with sheep's eyes.

The apparatus used is shown in the accompanying diagram, which is not drawn to scale. Two glass reservoirs R R, containing the fluid to be injected, are suspended against an upright scale, and can be readily raised to any height from 0 up to 80 cm. The reservoirs are connected with each other below by means of a flexible tube and stop-cock S. When the stop-cock is open the fluid remains at the same height in the two reservoirs, and equal pressures are maintained irrespective of the amount which may issue from either; when it is closed the reservoirs can be adjusted to give different pressures at pleasure. Each reservoir is connected by means of a glass syphon and flexible tube with a horizontal glass tube on a graduated scale. The cubic content of the graduated tubes is 50 cub. mm. for each degree; the readings are taken in 10ths of a degree, so that the smallest quantity measured is 5 cub. mm. To the other ends of the graduated tubes are attached the flexible tubes T T, each of which carries in its extremity a hypodermic needle, and a clamp, C, by means of which it can be closed at pleasure. An air-bubble in each graduated tube serves to indicate the movement of the fluid, the position of the bubble being recorded at regular intervals of time. Fluid having been caused to flow through the tubes from the reservoirs to the needles, to the absolute exclusion of all air, each syphon is raised for a moment out of the fluid and then replaced; when the bubbles thus introduced appear at the scale, the clamps C C are closed, and the apparatus is ready for use.

The fluid employed in almost all cases was water containing aniline blue in solution, so as to render visible the injection of the ciliary vessels or any other outlets through which it might escape. A pressure of 30 cm. (equals 25 mm. of mercury) was adopted as the standard pressure throughout, this being probably the average

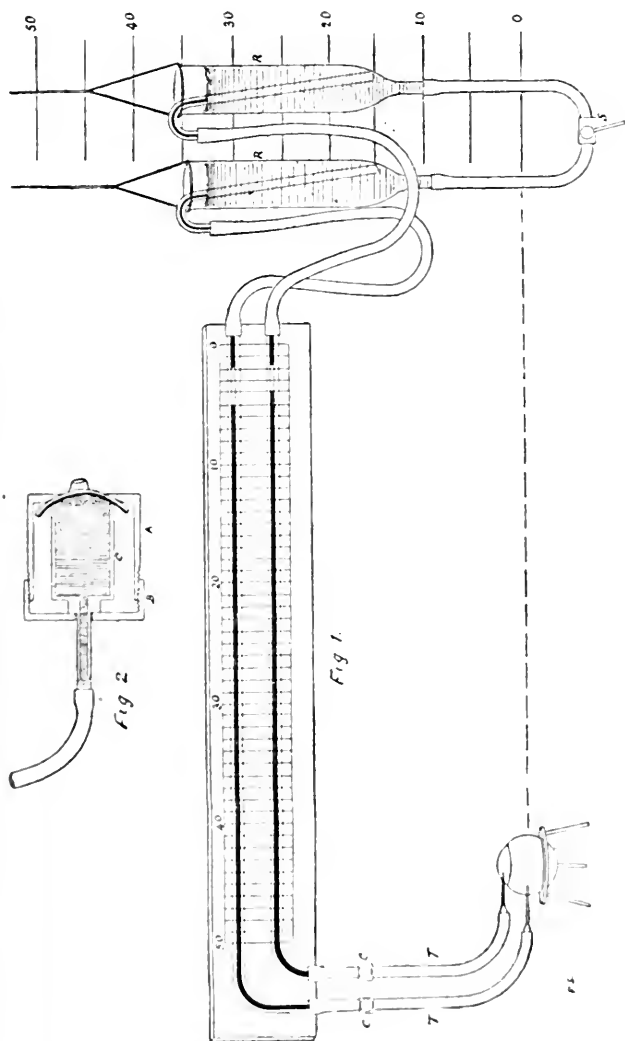
normal pressure in man, and some, at least, of the lower animals: (Glaucoma: Its Causes, &c., p. 97.) The readings were taken every ten minutes, and sometimes every five minutes; it will be sufficient here to state the escape in periods of half-an-hour.

At the commencement of an injection the fluid always moves quickly for a short distance along the tube, indicating the filling up of the previously slackened globe; to avoid confounding this movement with an escape by filtration, an interval of at least five minutes was allowed in every case before making the first record.

The experiments may be divided into two groups:—

1. *Single injections*: In these the fluid was injected into one chamber only, vitreous or aqueous, as the case might be; the two fellow eyes of the same animal were usually experimented on at the same time, the one receiving the injection in the aqueous, the other in the vitreous chamber. 2. *Double injections*: In these the fluid was injected into both chambers simultaneously as shown in the diagram, the pressures being equal or different according to the object of the experiment.

In analysing the results it must be noted, in the first place, that considerable differences exist between eyes taken from individuals of the same species; the ciliary vessels when injected from the anterior chamber differ visibly in size and distribution, and the amount of fluid escaping through them differs accordingly. The two eyes of the same individual present smaller differences. Secondly, it must be noted that the escape differs in successive periods of time in the same eye. In nearly all cases it progressively diminishes. The greatest reduction is generally observed during the first period of ten minutes and in eyes still quite warm from the orbit. This suggests that the fall of temperature is one cause of the reduction: the viscosity of fluids—their adhesion to the surfaces which contain them—increases with loss of heat. But it is not the only cause, for the reduction still occurs, though generally in smaller ratio,



when loss of heat has ceased. The escape during the second half hour was in one case reduced to about 6-10ths of that in the first half hour; more often to about 7 or 8-10ths, and in some cases the reduction was still less than this. When comparing the escape during one period with that during a subsequent period under a different pressure, this tendency must be taken into account.

SINGLE INJECTIONS.

*Injections into Anterior Chamber (Sheep).—*Ten eyes; experiments begun not more than twenty minutes after death. Pressure 30 c.m. Escape during first half hour, 715, 775, 975, 375, 635, 825, 935, 765, 1135, 720. Average 785 cub. mm. Fluid at first colourless, later blue, dropped from the cut tissues near the equator; the ciliary vessels showed a blue injection.

*Injections into Vitreous Chamber (Sheep).—*Ten eyes; experiments begun not more than twenty minutes after death. Pressure 30 c.m. Escape during first half hour, 225, 235, 395, 200, 220, 255, 260, 300, 265, 395. Average 275 cub. mm. Colourless fluid, in smaller quantity than before, escaped from the cut tissues near the equator. After several hours, sometimes earlier and sometimes later, the escaping fluid became slightly tinged with blue, and the ciliary vessels presented a faint blue injection. In order to have the optic nerve under inspection and unwetted by the fluid escaping near the equator, the eyes were placed, in some instances, with the cornea downwards. No escape of fluid was perceptible through or near the optic nerve, and after eighteen hours there was no blue colouration in this region.

With regard to the escape at the optic nerve, I made further experiments with another apparatus, shown half size, in section, in figure 2. A is a cylindrical brass box with a funnel-shaped hole in the bottom to receive the back of the eye. A circular piece including sclera,

choroid, retina, and optic nerve, cut from a perfectly fresh eye, is placed in the box. The inner tube C is pressed tightly upon it by screwing on the cap B. C is filled with the coloured fluid and connected by a flexible tube with a graduated glass tube and reservoir as in the other apparatus. Under a pressure of 30 c.m. the air-bubble indicated an escape of 27 cub. mm. in the first half hour; 7·5 in the second; 7·5 in the third; 2·5 in the fourth; 1·5 in the fifth; and during the following twenty-four hours an average escape of less than half a cubic millimetre per half hour. During the latter period the exposed surface became tinged with blue except the section of the nerve-trunk which remained colourless. It is probable that some portion of the amount indicated in the earlier periods was due to yielding of the sclera rather than to filtration through it, for there was no perceptible exudation from its outer surface.

Effect of Higher Pressures.—Beginning with 30 c.m., the pressure was raised 10 c.m. at the end of each half hour until 80 c.m. was reached; after each rise of pressure an interval of five minutes was allowed before beginning the record for the next period, in order to eliminate the effect of the increased distension of the globe. The fellow eye was injected at the same time under a constant pressure of 30 c.m., for the sake of comparison. Both in aqueous and in vitreous injections the first rise of pressure, from 30 to 40 c.m., increased the escape, or lessened its diminution; the second from 40 to 50 c.m., appeared to do the same; the higher pressures reached subsequently appeared to lessen rather than to increase the escape. (On this point *vide* Adolph Weber, *Transact. Internat. Med. Cong.* 1881; *Sect. Ophthalmol* p. 79.)

Position of Lens and Iris.—After the injections had been carried on for various periods, and under various pressures, the eyes, with the needles undisturbed, were in some cases frozen solid in ice and salt, and bisected. In several cases rough drawings were made with the micro-

scope and reflector (*vide Ophthalmic Review*, vol. ii, p. 73) before the specimen thawed. The anterior chamber was shallower after vitreous injections than after aqueous injections. After a vitreous injection at 80 c.m. pressure, lasting many hours, the base of the iris was found to be pressed against the cornea, so as to close the angle of the anterior chamber, elsewhere the chamber was 2 mm. deep. The fellow eye injected at 30 c.m. pressure showed an anterior chamber of the same depth, but a more open angle.

After a prolonged injection into the anterior chamber, I found on bisecting the frozen eye that the vitreous body showed no trace of colour even at its anterior limit, although the contiguous aqueous chamber had been filled for eighteen hours with blue fluid under 80 c.m. pressure (Exp. 47). Moreover, the anterior chamber was not exceptionally deep. If vitreous fluid had escaped in any considerable quantity during the period in question, either the anterior chamber would have become much deepened, or blue fluid would have passed from it into the vitreous. The escape at the optic nerve must have been extremely small.

The foregoing results show, with regard to the freshly excised eye :—(a). That the escape of fluid from the eye is about three times more rapid during injection into the anterior chamber than during injection into the vitreous chamber. (b). That the escape of fluid at the back of the eye is extremely small as compared with the escape in the ciliary region. They suggest also (c) that the escape from both chambers, during such injections, is influenced by the more or less advanced position of the iris base. That this is actually the case will appear from the results of the double injections.

DOUBLE INJECTIONS.

A. *Equal Pressures in Aqueous and Vitreous Chambers.*
—When the two reservoirs stand at exactly the same

height the amounts of fluid entering the eye through the two needles respectively are influenced by extremely slight causes. Thus, if one of the needles be slightly greasy at the tip, the fluid will enter the eye in larger proportion through the other. Again, if the aqueous tube be opened many seconds before the vitreous tube, the lens and iris are displaced backwards, and their subsequent recoil to the normal position aids the flow from the vitreous needle, and checks that from the aqueous needle. When the pressures are absolutely balanced the aqueous needle certainly transmits more fluid than the vitreous needle, but the ratio is so easily influenced by slight causes, that the figures have little significance. The significant matter is the total amount which escapes from the eye by filtration during simultaneous injection into both chambers, and this is indicated by the sum of the movements in the two tubes.

Six eyes ; experiments begun not more than twenty minutes after death. Pressure 30 c.m. in both chambers. Total escape 464, 329, 540, 390, 685, 505. Average 485 cub. mm.

A comparison of the foregoing results will show that much less fluid escapes from the eye during simultaneous injection of both chambers than during injection of the aqueous chamber alone. Since the pressure in the aqueous chamber is the same in the two cases, the diminished escape must be due to a narrower outlet. To put the matter in another way: when the aqueous chamber only is injected the angle opens more widely than when both chambers are injected, and the wider angle permits a more rapid escape. It will be seen immediately that when a higher pressure is established in the vitreous than in the aqueous chamber, the rapidity of the escape is influenced in a still more decided manner.

B. *Unequal Pressures in Aqueous and Vitreous Chambers.*—When one reservoir stands higher than the other the one air bubble advances, the other retires,

showing that fluid is entering the eye through the one needle and leaving it through the other. The diaphragm between the two chambers (lens, zonula, processes, and iris) is displaced until the increased tension of the zonula balances the excess of pressure on the one side; the one chamber is thereby increased the other diminished in size. Equilibrium being established in the diaphragm a stream passes through the zonula from the one chamber to the other, and fluid continues to leave the eye through the needle connected with the lower reservoir. The amount which escapes by filtration is then ascertained by subtracting the backward movement of the one bubble from the forward movement of the other.

Six eyes; experiments begun not more than 20 minutes after death. Aqueous pressure 30 c.m., vitreous pressure 35 c.m. Escape by filtration during first half hour 90, 35, 55, 50, 55, 15. Average 50 cub. mm. The iris base was gradually pressed forward until in places it was visibly in contact with the periphery of the cornea; the pupillary border did not touch the cornea—the needle could be moved freely between the two.

It will be noticed that in these last experiments the pressure within the eye was greater than in the previous series, and that, nevertheless, the escape was much smaller. Further, it will be noticed with regard to each series that the escape by filtration was greater or less according as the mode of injection tended to widen or to narrow the angle of the anterior chamber:—

	Cub. mm.
Injectons into anterior chamber	Escape 756
Into both chambers with equal pressure	„ 485
Into vitreous chamber	„ 275
Into both chambers with higher vitreous pressure	„ 50

Many experiments were made with other degrees of pressure and with various changes of pressure, in successive periods. It is unnecessary to record them in detail. In several cases it was found that an excess of

vitreous pressure of only 1 c.m. decidedly checked the escape. By placing the vitreous reservoir 15 c.m. higher than the aqueous reservoir it was possible to empty the anterior chamber almost completely, and to apply the iris closely to the cornea, and under these circumstances the escape appeared in more than one instance to be absolutely arrested. But this result must not be accepted too literally, for an error of a few cub. millimetres might easily occur. It is, however, a further proof that very little fluid escapes otherwise than through the anterior chamber.

With bullocks' eyes used immediately after death I obtained results closely resembling those described for sheep. Pigs' eyes, which I could not obtain until some hours after death, gave similar but more variable results; after experimenting on a large number I abandoned them in favour of sheep. I have made observations of the same kind on the human subject in three instances, but not soon enough after death to warrant a comparison with the results given above, though as far as they go they are similar.

Before concluding I must correct a statement published by myself some years ago (*Glaucoma: Its causes, &c.*, 1879, p. 144, &c.). In my earlier experiments I injected coloured fluid in nearly the same manner as at present, but did not measure the amount of fluid which passed through the chambers. I found, as at present, that when the vitreous reservoir stood a few centimetres higher than the aqueous reservoir, an injection of the ciliary vessels did not occur; also that coloured fluid injected into the vitreous failed to make its appearance at the surface of the globe for several hours. I inferred that injection into the vitreous chamber only, pushes the diaphragm forward sufficiently to close the angle of the anterior chamber and to arrest filtration. My present experiments show that this inference was incorrect, or rather that it was an exaggeration of the truth. During vitreous injection the escape is much slower than during aqueous injection,

and the angle of the chamber is less widely open, but, at least when a normal pressure is employed, filtration is not arrested. The injected fluid diffuses very slowly through the vitreous, and a large portion of the uncoloured vitreous fluid is driven out through the aqueous chamber before the visible escape of the injected fluid begins.

The fact that filtration out of the anterior chamber is readily retarded by slight pressure on the iris-base from behind, was demonstrated by my former experiments; it is now more definitely established by the quantitative tests above described.

With regard to the much-debated question of the escape at the papilla, these experiments on excised eyes do not, of course, disprove its existence, but they show that it must be extremely small in amount as compared with the escape from the anterior chamber. This agrees with the results obtained by Gifford and Leplat according to which the journey of a particle through the vitreous from front to back occupies some days, and iodide of potassium is found near the papilla thirty-eight hours after its secretion into the vitreous body.

My experiments do not suffice to show whether there is, under normal conditions, a persistent stream from the vitreous to the aqueous chamber, but they do show that fluid passes easily from one chamber to the other under a very slight excess of pressure on one side of the diaphragm. It seems certain that so long as the diaphragm remains permeable, and the intra-ocular fluid diffusible, any tendency to excess in either chamber would be quickly neutralised by osmosis into the other, an arrangement which is, no doubt, essential to the stability of the lens in its proper position. If the normal stream of fluid which enters the vitreous from the ciliary body is of larger amount than the minute stream which escapes around the central vessels of the optic nerve, then, unquestionably, the surplus, whatever it may be, escapes through the anterior chamber.

ABSTRACTS OF LECTURES ON THE PHYSIOLOGICAL AND PATHOLOGICAL CONDITIONS OF THE PUPIL AND ACCOMMODATION.

DELIVERED AT THE ROYAL COLLEGE OF SURGEONS OF ENGLAND.

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LECTURE II.

On the Pupil—(continued).

The Pupil in Health.—The following statements are based on the examination of the pupils of over 900 individuals.

Size and Activity.—The size of the pupil varies chiefly with the amount of light, state of accommodation, and also the general condition of tone of the patient. There is no definite relation between the pupil and the colour of irides or hair, sex, or refraction. The pupils are often in health slightly different in size. Age tends, after 45 years, to diminish the pupillary aperture, and the action of atropine and cocaine is less marked on the iris, though the effect of eserine remains the same.

The changes in the pupil consequent on movements of the eyeball, are perhaps best seen by taking a normal example; the measurements are given for the right eye. Light reflex (daylight). Both eyes open:—4 mm.; left eye closed, 4.5 mm.; left eye closed and then opened, 3.5 mm. at first, and afterwards, 4 mm.; both eyes shaded, 5 mm. Accommodation (daylight). Looking down and in:—Both eyes open, 2.25 mm.; left eye closed, 3.25 mm.; relaxation of accommodation, 4 mm. Looking externally, 4.5 mm.; relaxation of accommodation > 5 mm. Sensory reflex up to 5 mm.

Associated Actions of the Pupil.—On every internal

movement of a normal eye the pupil contracts slightly, and on the eye again moving outwards the pupil dilates, regaining its former size. In some rare cases the pupil dilates markedly with all external movements;* this is seen also in some cases of paralysis of the external rectus muscle, in which forced attempts at external movement are followed by dilatation of the pupil. During conjugate deviations of the eyes, the pupils, as a rule, are the same size. During the act of accommodation the pupil contracts, and this is best seen when the eye is directed down and inwards; on looking outwards and accommodating, it is scarcely noticeable. On relaxation of accommodation the pupil dilates markedly.

Shape.—The pupil is generally circular, the centre being slightly to the nasal side of the cornea; a dilated pupil is frequently oval, the long diameter being vertical; the smaller the pupil the less likely it is to be circular.

Normal Pupil.—It is necessary for a pupil to be normal that, besides being regular in shape, size, etc., it should pass the following tests:—Direct and consensual light reflex; sensory reflex; movements associated with accommodation, convergence, divergence, conjugate deviations of the eyes; action of the two classes of mydriatics, atropine and cocaine, and also of a myotic, as eserine.

The pupils in the following diseases have been found by the lecturer to be normal, although otherwise stated by some authorities:—Hysteria, Graves' disease, tobacco amblyopia, diphtheria (except in rare cases of palsy of third nerve), and in patients under the influence of nitrite of amyl.

Pathological states of the Pupil.—Most of these may be classified under the headings of Isocoria (equal pupils) or Anisocoria (unequal pupils), and each class may be further divided into the subdivisions of mydriasis and myosis.

* Transaction of Ophthalmological Society, vol. vi., p. 378.

Isocoria.—I. Mydriasis : A, acting to light and accommodation ; B, not acting to light and accommodation ; C, acting to accommodation but not to light.

A. (1) May be due to stimulation of both mydriatic tracks generally central as by strychnia, or peripheral as by cocaine ; (2) vasomotor due to constriction of blood-vessels or general bloodlessness ; (3) stimulation of a sensory nerve ; (4) violent muscular exercise.

B. Destruction or palsy of both myotic tracks or pupillary muscles, usually nuclear (hæmorrhage, tumours, etc.), or peripheral (blows or drugs,) and some cases of blindness following disease of optic nerves.

C. Cases of locomotor ataxia.

Certain diseases have often bilateral mydriasis as a symptom :—Typhoid fever, aortic insufficiency, commencing insanity, meningitis (after initial contraction), cerebellar disease, hydrocephalus, helminthiasis, epilepsy (tonic stage), migraine, middle meningeal hæmorrhage, &c.

II. Myosis : A, acting to light and accommodation ; B, not acting to light and accommodation ; C, acting to accommodation but not to light.

A. (1) Paralysis of both mydriatic tracks, chiefly central (Cheyne-Stokes breathing, &c.) ; (2) stimulation of both myotic tracks (morphia), or both pupillary muscles (eserine) ; (3) excessive use of accommodation, as in watch-makers, etc. ; (4) vascular congestion of irides, as in fevers, etc.

B. Locomotor ataxia, etc.

C. Locomotor ataxia, etc.

The chief diseases characterised by bilateral equal myosis are hæmorrhage into upper part of pons, general paralysis of the insane, meningitis, anæmia of the brain, paralysis agitans, venous obstruction as in mitral regurgitancy, pneumonia, typhus, variola, algid stage of cholera, epilepsy (sometimes at commencement), anterior polio-myelitis.

Cases of anisocoria may be divided into two great

groups : one in which one pupil is normal, and the other in which both are abnormal.

Anisocoria (one normal pupil).— I. Mydriasis : A, acting to light and accommodation ; B, not acting to light and accommodation ; C, acting to accommodation and not to light.

A. (1) Stimulation of one mydriatic track in any part of its course ; (2) increased intra-ocular tension ; (3) rarely after iritis.

B. (1) Paralysis of one myotic track or pupillary muscle.

C. Very rare cases showing Argyll-Robertson pupil in only one eye.

II. Myosis : A, acting to light and accommodation ; B, not acting to light and accommodation ; C, acting to accommodation and not to light.

A. (1) Paralysis of one mydriatic track at any part of its course ; (2) stimulation of any part of one myotic track or of one pupillary muscle ; (3) vascular congestion of iris due to iritis, diminished intra-ocular tension, etc. ; (4) reflex by painful stimulation of the fifth nerve, as in keratitis, iritis, and other ocular diseases.

B. Complete posterior synechia.

C. Very rare cases showing uniocular Argyll-Robertson symptom.

Unequal pupils are often found in cases of apoplexy, acute meningitis, chronic and acute alcoholism, general paralysis of the insane, locomotor ataxia.

Hippus.—This is a condition of the iris characterised by choreic spasms producing rapid contraction and dilatation of the pupil. These movements are independent of light or position of the eye, and are seen in cases of epilepsy, mania, general paralysis of the insane, commencement of sympathetic ocular disease (Gunn), cerebellar tumour, etc. They are often associated with nystagmus, especially of central origin.*

* Transactions of Ophthalmological Society, vol. vii., p. 264.

Drugs influencing the pupil when taken internally, but not acting locally, are chloroform, morphia, strychnia, curare, quinine.

Chloroform.—During the administration of this drug for anæsthetic purposes the pupils vary, according to the stage of the anæsthesia. In the excitement stage the pupil is dilated (acting to light), in the stage of anæsthesia the pupil is contracted; but if the drug be now pushed to a dangerous point the pupil dilates, and is motionless to light. If the eyes are fully under atropine or eserine beforehand, no effect on the pupil is observed; but during the ordinary anæsthetic stage, the pupil often contracts if the eyes are under cocaine.

Morphia.—This drug applied to the conjunctiva has no effect on the pupil, but if given internally it produces bilateral myosis (acting to light). Morphia has no effect on the pupil of a fully atropinised eye. It acts on the centres for the contraction of the pupils, and not on the peripheral endings of the nerves or muscles; elsewhere in the body it does not affect peripheral nerves or muscles.

Strychnia.—Poisonous doses of this drug produce dilatation of the pupil, which is due to stimulation of the medullary mydriatic centre owing to deficient aëration of the blood, as on artificial respiration the pupil remains normal.

Curare.—The mydriasis following poisoning by this drug is due to the same cause as that produced by strychnine. In birds curare acts directly on the striped muscle of the iris by paralysing it, and so producing mydriasis.

Quinine.—In large doses this drug produces a bilateral mydriasis due to constriction of the blood-vessels.

Sleep.—The condition of the pupil during sleep is that of myosis, and this myosis is greatest during deep sleep. It is due to central stimulation, and not only to the general convergent position of the eyes. The fully atropinised pupil during sleep is unaffected, but cocaine mydriasis is overcome and myosis ensues.

CORNEAL FIBROMA (?)*

By J. ALFRED SCOTT, F.R.C.S.I., AND J. B. STORY, F.R.C.S.I.

The growth to which we have given the name of Fibroma occurred in the cornea of a young man aged 20, admitted into St. Mark's Ophthalmic Hospital, January 31st, 1888. He had suffered from granular ophthalmia for many years, and had been in St. Mark's Hospital in March, 1886. On that occasion, a small yellowish white growth was observed in his left cornea, and this growth now presented exactly the same aspect in size, colour, and position that it did in 1886. On both his visits to hospital he sought advice and treatment for the results of granular ophthalmia, trichiasis, entropium, pannus, confined to the right eye.

The left eye, too, had suffered to a considerable extent from the ophthalmia. The conjunctival sac was contracted, the inner surfaces of the lids scarred, and the cornea exhibited at its periphery a slight abortive pannus, which had been arrested by treatment and had never spread further than 1 or 2 mm. from the sclero-corneal margin. The tumour, if we may so term it, occupied the outer upper quadrant of the cornea, was oval in shape, the long axis 6 mm., the short 4 mm., and lay with its long axis perpendicular to the corneal diameter which bisected it (Fig. 1). Its colour was yellowish white, rather more yellow than white, to a great degree resembling the colour of the meibomian glands on the inner surface of the eyelids as seen through the conjunctiva. Small blood-vessels could be seen ramifying over the growth, spreading from the sclero-corneal margin where the

* Read before the Pathological Section of the Royal Academy of Medicine in Ireland.

latter just came in contact with the nearest portion of the periphery of the tumour. This growth was sharply marked off from the surrounding corneal tissue, its surface was not raised above that of the rest of the cornea, and the epithelium passed over its borders without a break or any alteration of level whatsoever. It appeared to occupy the whole thickness of the cornea. There were in other portions of the cornea a few faint interstitial nebulae such as are frequently seen in old cases of keratitis, but in other respects the eye was anatomically normal—viz., tension, depth of anterior chamber, size and activity of pupil, and freedom of iris from all adhesions to cornea or lens.

The unusual appearance of this spot in the cornea excited considerable speculation as to what its precise nature might be. It differed in many respects from any form of cicatricial opacity that has been seen in the corneal tissue, its position being deeper, its shape more globular, and its colour yellower, while its vascularity was too well developed for a cicatrix of some years' standing.

Opinion rather tended to assume that the opacity was of a fatty nature, its colour being strongly suggestive of fat.

The patient was really anxious to have the deformity removed, as he believed that it was increasing—a belief which, however, was not justified by the observed facts, and although he was informed that complete removal was impossible, he willingly consented to have as much of it taken off as could be safely accomplished. As the growth appeared to extend through the whole thickness of the cornea, it was manifest that it could not all be excised without serious damage to the eyeball.

Accordingly, a piece of the growth 4 mm. \times 3 mm. was excised under cocaine anaesthesia. There was very considerable hemorrhage from every portion of the in-

cision, which extended at least half-way through the thickness of the cornea, and probably deeper. No transparent cornea was detected even on the floor of the wound, although subsequent microscopical examination showed that, in places at all events, true cornea had been exposed.

The little ulcer which was left after the removal of this portion of the opacity, healed up in the course of some days, blood-vessels developing with great rapidity all round its borders, and its appearance during the process of repair being more like that of a scleral than a corneal wound.

The portion removed was hardened in Muller's fluid and sections were made from it in a direction at right angles to the surface of the cornea (Fig. 2). From them it was evident that the conjunctiva corneæ (*a*) was unaltered, but immediately below this the abnormal tissue (*b*) was to be seen apparently supplanting the fibres of the cornea proper. The portion removed was not equal in thickness to the average cornea, but sufficient tissue had been taken to show the healthy epithelium above, and some true cornea (*c*), below the suspected new growth, the interval between being about 0.2 mm. to 0.4 mm.

The "new growth" was mainly formed of connective tissue, with a large number of blood-vessels, and numerous patches of nuclei; in some places so numerous as to suggest sarcoma, but in others very few. The appended drawing (Fig. 2) shows an average section.

That there was no actual thickening of the cornea in this locality was evident from the fact observed that its outer curvature was unaltered, it being extremely improbable that the cornea could be bulged inwards by any new growth without its external surface exhibiting a corresponding elevation, so that the condition present in this case is rather to be regarded as a supplanting of the corneal tissue proper by another variety



Fig. 1

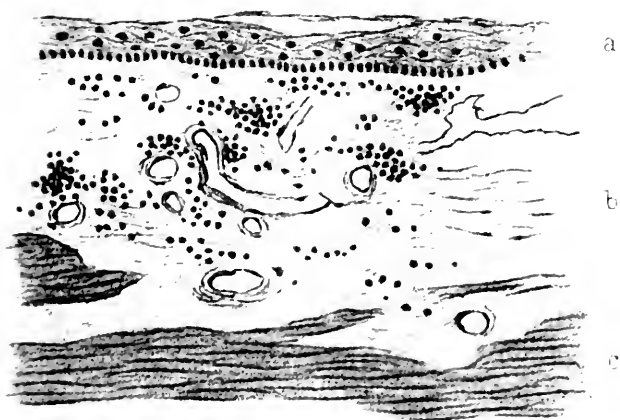


Fig. 2



of fibrous tissue, than as a new growth of fibrous tissue developing in this situation.

What the precise pathology of this curious affection may be is not very easy to determine.

Microscopically, the tissue is very similar in structure to a cicatrix, such as might have resulted from an old ulcer, or possibly an interstitial infiltration which became subsequently organised. An ulcer of such a size, and in such a position, could hardly have occurred without perforation, and consequent synechia anterior, which was not present; and the scar left by such an ulcer would have been somewhat pyramidal in shape, the base of the pyramid corresponding to the external surface of the cornea. Now the little tumour here was apparently globular in shape—more accurately, it was egg-shaped, the anterior and posterior surfaces being somewhat flattened as they came in contact with the external and internal surfaces of the cornea. Finally it is not usual for corneal scars to keep up the rich capillary vascularity that this fibroma possessed, even when synechia anterior exists.

It is indeed possible to explain the appearances by the supposition of an unabsorbed and organized infiltration of the cornea in this position, and if we could be certain that the cornea had at any period of the boy's life been wholly transparent we might adopt this theory; but when he came first to hospital he did not seem to be aware of the existence of the spot on his eye, and it was only on his second visit, two years later, that he stated that the spot was growing bigger—a statement which could not be relied on when the notes taken on his first visit were compared with his then condition. It is, therefore, not impossible that the corneal opacity may have been congenital, anterior to the ophthalmia, the results of which induced him to seek medical advice, and if we accept this possibility there cannot be any improbability in a theory which

merely assumes a congenital supplanting of one variety of connective tissue by another.

Explanation of Plate.

Fig 1.—Corneal Fibroma (?) Natural Size.

Fig. 2.—Section of Same $\times 100$.

a. Conjunctiva.

b. Abnormal Fibrous Tissue.

c. True Corneal Tissue.

W. DOBROWOLSKY (St. Petersburg). The Cause of Erythropsia. *V. Graefe's Archiv.* XXXIII. 2, p. 213.

An examination of the published cases shows that while most of them have occurred after cataract extractions with large iridectomies, some have been observed in young individuals with lenses intact. The patients have usually complained of seeing objects coloured violet, pink, or reddish; but some have seen them of an intense red, or a blood-red, and some have had this red colour transformed into green by closing the lids.

Dobrowolsky suggests the three following hypotheses as, *a priori*, possible to account for the phenomena:—

(a). Chromatic Aberration. From this cause white surfaces appear surrounded at one time by a yellowish red, at another by a bluish border. The effects of this aberration are naturally more marked in aphakia.

(b). It is known that red and yellow tones prevail in bright sunlight, and blue and violet in weak sunlight; hence, it might be inferred that in aphakia, with a large coloboma iridis, the bright sunlight which spreads over the whole fundus sets up predominance of reddish tones, as the result of which objects appear red.

(c). The sky appears to us blue in bright sunlight; it might be supposed that when an eye had gazed for some time at the sky a negative after-image would arise, which would seem yellow or orange according to the shade of the blue of the sky.

Direct experiments in which the eye was exposed to bright sunlight with dilated pupil negatived the first two

hypotheses, and lent merely theoretical support to the third.

The experiments were the following:—The left pupil was dilated by atropine, and then the eye was fixed for several seconds upon a bright cloud in the neighbourhood of the sun or the edge of the sun itself; the observer then gazed upon a sheet of white paper on a dark background at a distance of twenty feet in a well-lighted room.

If the sun was very bright and he had fixed its edge, no object could be seen at first, but after a few moments all white objects appeared to be of a violet hue, the effect disappearing after some minutes. If a cloud had been the object fixed, all white objects in the room appeared immediately to be of a violet colour. If he fixed the edge of the sun or a cloud through a window, the glass of the window appeared often of a beautiful violet colour, as did all clouds and other white objects in the field of vision. If thick, dark, opaque clouds were present they appeared reddish, and not violet.

The only difference observed in these experiments was that in some cases all objects in the field of vision assumed a violet hue, in others, on the contrary, the colour restricted itself to the objects in the immediate neighbourhood of the fixation point.

If he looked immediately after the experiment through a window into the garden, the ground appeared also of a violet colour; the leaves of the trees, however, and all foliage, took, on the contrary, a bright yellowish hue.

The violet colour observed in these experiments persisted occasionally for over a quarter of an hour; the longer the experiment continued, the more frequently it was repeated, and the brighter the sunlight, the longer the violet colour persisted; but the following observation is the most important in connection with the published cases of erythropsia. Long after the violet colour had disappeared a momentary glance at any bright object or the casual entrance of a small quantity of sunlight into the eye was sufficient to reproduce the violet sometimes even over the whole field of vision. Long after the violet colour has disappeared from the whole field of vision, the eye remains in a condition of latent irritation, which showed itself by all yellowish colours appearing as a carmine red.

Similar results were obtained from exposure of the eye to ordinary diffused daylight and to white objects not directly illuminated by the sun, as for example, white houses and snow, but in these cases the experiment was often unsuccessful. All these appearances were only seen by the left atropinised eye, and the subjective sensation never at any time spread to the right eye.

On repeating the experiments with the non-atropinised eye, different results were obtained by fixing the middle of the sun, or its edge. In the first case a distinct, sharply marked negative after-image of the sun was seen, its middle of a bright blue colour, and its edges of a violet. In order to see the above after-image the observer must be in a somewhat badly-lighted room, and the sun must not be covered with clouds. When the edge of the sun or a bright cloud was fixed, Dobrowolsky frequently, but not always, perceived a faint violet colour in objects close to the fixation point.

From these experiments he concludes that a maximal mydriasis is the essential condition for the production of erythropsia in the whole field of vision or any large part of it; and secondly, that the violet colour is formed by a negative after-image of the sun rays which had been spread over the retina.

The cases in which patients stated that they saw objects coloured green indoors, or by closing the eyelids, are also accounted for.

When after gazing at the edge of the sun or a bright cloud, all white objects appear violet, the darker objects in the field appeared green, as the result of contrast. If the negative violet after-image of the sun fell upon a yellow object, it sometimes appeared of a bright green; if it fell upon a dark object it appeared of a dark green colour.

The reason that erythropsia is not more frequently observed is: first, the natural tendency to protect the eye against dazzling light, a tendency which is especially strong after a cataract operation. Secondly, in order to experience the phenomenon, appropriate objects must happen to be in the field of vision; and thirdly, the patient must either know what the true colour is of the objects observed, or must have sufficient vision in his second eye to control the

colour sensations of the other one. Lastly, it must be remembered that by frequent exposure to dazzling light the eye seems to become accustomed to its influence.

J. B. S.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

THURSDAY, JUNE 14TH, 1888.

J. W. HULKE, F.R.S., President, in the Chair.

Reported by JOHN ABERCROMBIE, M.D.

Paralysis of the Fifth Nerve associated with Cataract.—Dr. W. J. COLLINS.—A case of paralysis of all parts supplied by the sensory branches of the right fifth nerve; muscles of mastication unaffected. No history of syphilis and no cerebral symptoms. The patient had had severe pain in the anæsthetic parts for eight months and the sight of the right eye had failed. There had been no herpes and no conjunctival or corneal affection whatever. There was diffuse opacity of the right lens; the left eye and side of face were normal, and vision good. He considered the lesion located somewhere between the root of the nerve in the pons and the subdivision of the Gasserian ganglion. This case conflicted with the views of Snellen and others respecting trophic nerves. Here the lens, non-innervated, and protected from foreign irritants, suffered, while the highly-innervated and anæsthetic cornea retained its pellucidity, notwithstanding eight months' habitual exposure.—Mr. T. PRIDGIN TEALE mentioned a case of cataract, in which puncture of one lens was followed by suppuration of the globe. The patient died shortly afterwards with aphasia, due to cerebral hæmorrhage, which was not entirely recent but partly resulted from an accident many months previously. He suggested that the disastrous results to the eye might have been the result of the nervous lesion.—Dr. COLLINS briefly replied.

Exostosis of Frontal Bone and Orbit with an Intracranial Growth.—Dr. EMRYS-JONES mentioned a case of, and showed specimens of, a large orbital exostosis associated with a myxomatous tumour in the anterior lobe of the brain. There

had been some epileptiform attacks, which the patient denied on account of his anxiety to have the growth removed. The attempt at removal had to be abandoned, and the patient died five days later from septic meningitis.—Mr. JONATHAN HUTCHINSON had seen several cases of exostosis of the frontal bone. In one, a young man, the exostosis grew into the frontal sinus on the left side and was removed by trephining ; another exostosis from the right side was early removed, but septic inflammation and death followed. In another case of a young woman the exostosis was very large, and a long time was spent and many saws were used in attempting to remove the growth, but only with partial success, a raw surface with bony base being left ; this suppurated and remained open for twelve months when further surgical interference led to the shelling out of the remainder of the exostosis ; a deep cavity was left, at the bottom of which some mucous material was seen, but the dura mater remained sound ; the eye had been previously lost ; ultimately the case did well and the wound healed.—The PRESIDENT said these cases pointed to the great risk of interfering when the cranial wall was perforated. He referred to two cases where the inner table was only involved, the roof of the orbit being free, in which removal of the exostosis was quite easy.

Optic Atrophy in Three Brothers, Smokers.—Mr. EDGAR BROWNE (Liverpool) read a paper on this subject. In the first patient, aged 40, vision had failed at the age of 27. A diagnosis of tobacco-amblyopia was made. The patient reduced smoking gradually, but continued to chew. Vision had steadily failed to shadows, but the pupils were three millimetres diameter, acted to light, and the patellar reflexes were good. Previously, vision was good ; general health always good. Optic discs, typical skim-milk atrophy, with attenuated vessels. He could see a flame or bright reflection from white at periphery of fields. The second patient was aged 33 ; sight became very bad six months before ; he also both smoked and chewed tobacco ; he could see a little in twilight. The knee-jerks were good. Pupils, three millimetres diameter, acted to light. The optic discs showed a general appearance of atrophy ; vessels pervious, but rather

small. He could see white paper test in lower temporal (right) and lower nasal (left) fields, but not at all centrally. In the third patient vision had failed for two years, patient being aged 23; could read J. 16. This patient continued smoking when warned. Pupils sluggish, but acted to light. Peripheral fields for white, both eyes normal; central scotoma for white and red in left eye, for red only in right; colour vision with wools good. Optic discs very white and smooth; veins perhaps a little large. The original assumption that tobacco could cause atrophy had been rather discredited since the significance of axial neuritis had been understood. These cases were closely related to the hereditary optic atrophy of Leber (though occurring rather late), but the term hereditary should not be adopted till our information was much more exact. In all three cases, tobacco was probably the determining cause of the atrophy. In all perception of light was better towards periphery than centre; none had visible neuritis; none had cerebral or spinal symptoms. The father, mother, and two sisters had good sight; a collateral relation had suffered. These cases might be taken as types of one group—namely, those in which an axial neuritis being once established tended to spread to the peripheral fibres, involving both sets in the subsequent atrophy. Exactly the opposite occurred in ordinary neuritis, in which the central fibres and vision might escape for a time. The following grouping of cases was suggested:—1. Ordinary tobacco-amblyopia, involving only central fibres; transient, and recovery on removal of the cause. 2. A class beginning with central negative scotomata, which progressed downwards till central defect became positive (or nearly so), and axial atrophy might be assumed, peripheral vision being unaffected. The part played by tobacco in these cases required investigation. 3. Cases like those under consideration, where retro-bulbar neuritis, beginning centrally, spread peripherally, giving rise to more or less pronounced atrophy. Here the personal proclivity was shown in young persons, members of the same family. If similar groups were found among non-smokers, search would be required to discover the exciting agent. Beyond these were (4) consecutive atrophy, and (5) atrophy accompanying spinal degeneration. At present the two last

groups were well understood, but cases illustrating the second and third groups should be collected.—Mr. HUTCHINSON mentioned a group of three, consisting of two young males who smoked and the mother of one of them (and aunt of the other) who did not smoke, all affected with optic nerve atrophy. In the case of the woman the inherited predisposition to nerve lesion must have been very strong. Eventually she became quite blind, but had very good health. Perhaps abuse of tea or coffee might have had a share in bringing about this effect; he was sure they sometimes caused deafness. He thought the Society might investigate the very rare group of women (non-smokers) affected with this form of atrophy. Mr. Browne had mentioned that his first patient was a total abstainer, this, in his experience, rather led to the production of the atrophy than the reverse; those who indulged in alcohol as well as tobacco were less liable to tobacco atrophy than were abstainers. These cases occurring in families were much more severe, more liable to end in blindness, and much less easily cured than the other forms.—Dr. EMRYS-JONES mentioned the case of a family of nine, but only five living, in which two had atrophy of the optic disc without definite cause, a girl at the age of seventeen and a boy aged nine; total blindness ensued.—Dr. HABERSHON referred to his paper read at a former meeting of the Society, dealing with hereditary cases of optic atrophy; in some a sexual cause appeared to operate.—Mr. WALKER thought that great losses of blood and a numerous family in the mother and grandmother might be a cause of optic atrophy in children.—Mr. BROWNE hoped an investigation, as suggested by Mr. Hutchinson, would be undertaken by the Society.

Card Specimens and Living Patients.—Mr. SILCOCK, 1, Sarcoma of Frontal Bone; 2, Sarcoma of both Orbits.—Mr. JESSOP, Case of Symmetrical Pigment Ring on Anterior Capsule of Lens.—Mr. J. HUTCHINSON, jun., Two Cases of Cicatrices in Vitreous and Retina.—Mr. G. E. WALKER, Case of Recovery from Occlusion of Pupil without Iridectomy.—Professor BERGER, 1, Sarcoma of Cornea; 2, a Refraction Ophthalmoscope.

ABSTRACTS OF LECTURES ON THE PHYSIOLOGICAL AND PATHOLOGICAL CONDITIONS OF THE PUPIL AND ACCOMMODATION.

DELIVERED AT THE ROYAL COLLEGE OF SURGEONS OF ENGLAND.

BY WALTER H. JESSOP, M.B., F.R.C.S.,

HUNTERIAN PROFESSOR OF COMPARATIVE ANATOMY AND PHYSIOLOGY,
ROYAL COLLEGE OF SURGEONS; DEMONSTRATOR OF ANATOMY AT
ST. BARTHOLOMEW'S HOSPITAL.

LECTURE III.

On Accommodation.

The ciliary muscle, like the pupillary, is composed in mammals of unstriated muscular fibre; the arrangement of the fibre is such that the whole muscle, on contracting, releases the suspensory ligament of the lens, and so renders the lens more convex. The contraction of the ciliary muscle enables the eye to accommodate for near objects, and the relaxation of the muscle gives rise to loss of power of accommodation.

Like all unstriated muscular fibre, the ciliary muscle is under the influence of two antagonistic sets of nerves—the short and long ciliary nerves. The short ciliary nerves are branches of the lenticular ganglion derived from the third nerve; on stimulation of the third nerve or the short ciliary nerves contraction of the whole ciliary muscle ensues, and on stimulation of one short ciliary nerve partial contraction of the muscle follows; on section of these nerves relaxation of the ciliary muscle takes place, producing paralysis of accommodation; but this can be overcome by stimulating the muscular fibre directly as by eserine, and so inducing spasm of accommodation. The centre for the nerves producing

contraction of the ciliary muscle is situated in the aqueduct of Sylvius.

The long ciliary nerves are branches of the nasal division of the ophthalmic; on stimulation of these nerves complete relaxation of the ciliary muscle ensues. The fibres of these nerves, influencing the ciliary muscle, come from the visceral branches of the fifth nerve, and do not follow, as do the mydriatic fibres, the course of the cervical splanchnics. The centre for the visceral fibres of the fifth nerve is in the medulla.

Atropine.—The local action of atropine on the ciliary muscle is to paralyse it, and so produce paralysis of accommodation; stimulation of the short ciliary nerves has no effect on the atropinised ciliary muscle. Eserine only acts on an atropinised eye if the muscular fibre is not completely paralysed, and it is more difficult, from its greater size, to fully atropinise the ciliary than the pupillary muscle.

Eserine.—This drug acts by directly stimulating the muscular fibre, and so inducing a spasm of accommodation, which can always be overcome by atropine.

Cocaine.—Cocaine acts by stimulating the endings of the long ciliary nerves, and producing paralysis of accommodation. The combination of cocaine with atropine increases and quickens the action of atropine. Eserine easily overcomes the paralysis of accommodation induced by cocaine.

Vaso-motor.—Priestley Smith showed that accommodation could take place in the bloodless eye, and that the act is independent of the blood supply.

Age.—The ciliary muscles after fifty, in two cases examined, have shown marked degeneration of the muscular fibres; age may thus also affect the pupil, and explain the diminished size of the atropinised pupil of old people. The effect of atropine also passes off much more quickly in old than in young people.

Disease.—Diphtheria produces often binocular paralysis of accommodation, which is probably nuclear in

nature. Paralysis or paresis of accommodation has also been often found in cases of pregnancy, lactation, anæmia, mumps, diabetes, fevers, locomotor ataxia, etc., and following a blow on the eye.

Spasm of Accommodation.—This is induced by spasm of the ciliary muscle, and is often met with in refraction cases. It is generally found in young hyperopes, is usually about 2 or 3 dioptries, but may reach 6 or 7 dioptries. In rarer cases there is partial spasm of the ciliary muscle giving rise to ciliary astigmatism. In cases of corneal astigmatism the ciliary muscle may contract partially, and by the production of a ciliary astigmatism exactly opposite to the corneal, neutralise this, and the eye thus becomes emmetropic. If one eye alone has corneal astigmatism the presence of ciliary astigmatism in this eye may induce consensual contraction of the ciliary muscle of the opposite eye. In cases of ciliary astigmatism correcting corneal astigmatism the latter is perceived by the patient on presbyopia setting in.

Associated action of Pupil.—In the normal eye the act of accommodation is accompanied by contraction of the pupil, and on relaxation of the ciliary muscle the pupil markedly dilates.

Spinal Pupils.—Argyll-Robertson showed that in some cases the pupil acted normally to accommodation, but was inactive to light. This condition is due to a nuclear affection; in two cases showing this symptom in one eye, while the other pupil was normal, there was absence of the consensual pupillary reflex. There is probably also a trophic change in the muscular fibre, as atropine does not act well, and the pupils are generally small.

Ophthalmoplegia Interna.—These cases, first accurately described by Hutchinson, exhibit paralysis of the intra-ocular muscles; if complete, there is paralysis of the pupillary and ciliary muscles; they are usually nuclear in their origin, but may in some cases be due to disease of the lenticular ganglion.

Associated Convergence.—In the normal state of accommodation there is also associated, besides contraction of the pupils, a convergent movement of the eyes. This convergence bears a definite relation to the accommodation power, and can be estimated by taking the nearest point of binocular vision. Landolt* has demonstrated the best manner of such estimation, and it should be carefully measured in all cases of refraction.

Ocular Headaches.—The most usual causes of such headaches are errors of refraction, spasm of the ciliary muscle, and alterations of the normal relations between accommodation and convergence power.

Conclusion.—The intra-ocular muscles are two circularly disposed muscles—the pupillary and ciliary, and in mammals consist of unstriped muscular fibre. They are each supplied by two antagonistic sets of nerves—the short and long ciliary. The short ciliary nerves induce on stimulation extreme contraction of both muscles, and the long ciliary nerves produce the opposite effect—namely, relaxation of the muscles. The fibres of the short ciliary nerves can be traced to different collections of cells as centres, thus separating the action of the pupillary from ciliary muscle. In the same way the long ciliary nerves are connected with different centres; by the visceral fibres of the fifth nerve they are connected with a centre in the medulla for the ciliary muscle, and by the cervical splanchnics and second dorsal nerve with the spinal cord and medulla for the pupillary muscle. Atropine, eserine, and cocaine act in the same manner on both muscles. The actions of the pupillary muscle are, to contract, to direct, and consensual light reflex, and in association with accommodation, and besides these to dilate to sensory reflex; the actions of the ciliary muscle are to contract on accommodation and to dilate on relaxation of accommodation. Thus the ciliary muscle acts normally in association with the

* The Refraction and Accommodation of the Eye, p. 283.

pupillary, and the pupillary may either act by itself or in association with the ciliary according to the stimulus provoking the action. The pupil may be affected as to its size by the condition of its blood-vessels irrespective of its muscular fibre, but there are no experiments showing that accommodation may be effected by vascular supply alone.

CAVERNOUS SARCOMA OF THE CHOROID.

BY KARL GROSSMANN, M.D.

OPHTHALMIC SURGEON TO THE STANLEY HOSPITAL, LIVERPOOL.

Plain and unmistakable as the existence of intraocular tumours in most instances seems to be, still there are cases in which it is difficult to arrive at the right diagnosis. The latter is all the more desirable, as a wrong diagnosis would mean a delay in carrying out the enucleation of the eyeball, and would thus probably increase the danger to the patient's life. I say "probably," because it is by no means established that the removal of an intraocular tumour, especially when of a melanotic nature, is of curative or prophylactic effect, and that the local affection is not merely a manifestation of a general diathesis tending to produce new growths in various parts of the body.

The case of melanotic sarcoma, related by Mr. Higgs before the Ophthalmological Society on May 3rd, judging from the short report before me,* seems to support the latter hypothesis, and moreover presented considerable difficulties in diagnosis, resembling in this latter respect the case I am about to describe.

Mr. J., æt. 49 years, came to me on the 22nd of November, 1887. He had been examined about a fortnight previously by several other specialists and had been told he was suffering from cataract, and that

* O.R. Vol. vii., No. 80, p. 187.

he would have to bide his time, glasses being of no avail. He did not tell me this until I had given him my own opinion of his case. My examination gave the following result :

Left eye. Cornea, aqueous humour and iris quite normal in every way. Lens somewhat opaque, shows several striae which are not very thick but go far towards the centre of the lens. Nothing abnormal in the fundus, which is, however, veiled on account of opacity of the lens. $V = \frac{1.5}{20}$

Right eye. Cornea, aqueous humour and iris quite normal, pupil free, movable and narrow. The lens was rather more opaque than in the other eye. When examined with the ophthalmoscope three well-marked slightly wavy striae were noticed near the posterior surface of the lens. These striae, although appearing hazy on account of the cloudiness of the lens, stood out clear enough against a rather dark red fundus. As the patient was of fair complexion, the dark hue of the brilliant red fundus was rather remarkable ; details, however, could not be distinguished, the pupil being narrow and the lens opaque.

When I tested the sight of this eye, I found vision completely gone with the exception of a small part in the lower outer segment of the field. Tension was slightly but unmistakably subnormal. In order to discover the reason of the extremely poor vision, I now put atropia into the eye and the pupil soon dilated to 7 mm. The lens appeared more opaque than before, the three striae were conspicuous, as were also some other equatorial obscurities. The fundus threw back a brilliant deep red reflexion which seemed to be coming from a region immediately behind the lens. Towards the inner and upper part of the eyeball, however, there was a small spot to be seen where the reflexion was of the usual light red hue of the healthy fundus. This once found, there was no further difficulty in perceiving the difference between the two red tints veiled though

they were by the lens. The ophthalmoscope gave no further information, but when oblique illumination was used the enlarged pupil revealed a remarkable appearance. Almost immediately behind the lens, there was a mass of a bright red colour, which towards the upper and inner quadrant of the eye became darker as though forming a recess, the mass appearing to have a convex surface. Details, however, could not be seen.

There could be no longer any doubt about the diagnosis of intraocular tumour; the diminished tension was quite compatible with the later stage of the disease, and the only unusual feature was not finding any trace of detached retina. For this, however, the reduced transparency of the lens sufficiently accounted.

The diagnosis of intraocular tumour being clearly established, the patient soon gave his sanction to have the eye removed, and on December the 7th, the enucleation took place. The wound healed satisfactorily within a week and without any disturbance.

Immediately after the excision, I cut the eye open by a section parallel to and in front of the equator.

Fig. 1 gives a representation of the posterior part of the eyeball the bottom of the figure ought to have been turned about 30 degrees to the left]. There was, immediately behind the lens, a round growth, like a small cherry, seated on a conical broad pedicle. The growth was of a



Fig. 1.

bright red colour, the pedicle was of a slaty black tint, and went over quite gradually into the healthy choroid. From this pedicle the round red part of the growth was springing, pushing before it the retina, which covered it in front like a veil. The retina was detached in the whole outer and lower half of the eyeball, the space between it and the growth being filled by a fluid of which extravasated blood seemed to form a great part. The vitreous was much shrunk and colliquated.

Fig. 2 represents a section through the tumour and the optic nerve. It shows how (on the left of the illustration) the retina kept in its place, and gave the small



Fig. 2.

normal reflexion noticed at the upper and inner quadrant of the fundus. The tumour is distinctly seen to spring from the choroid, without affecting the sclerotic. The pedicle is broad, and is attached a little below and in front of the region of the macula lutea. The cherry-like part of the tumour is connected with the pedicle by a constricted neck. The retina is pushed before the tumour, and on its foremost part is in close contact and thinned by pressure.

This section of the tumour was obtained after hardening in Muller's fluid. The deep parts are greyish white, the superficial parts of the pedicle slaty black. The spherical portion of the tumour has a red surface, and the parts shaded in the illustration are likewise of a reddish colour. Under the microscope these latter turn out to be large cavernous spaces filled with blood. The growth consists of round and spindle cells, in all possible stages of transition; it is enormously vascular, and contains *very few pigmented cells* found principally in the superficial layers of the pedicle. The anterior surface of the tumour (the part immediately behind the lens) is covered with a layer of cavernous spaces filled with blood. The tumour is therefore to be classified as a cavernous leuco-sarcoma.

The great vascularity explains the bright red colour which imitated the healthy fundus. The comparative absence of pigment makes the general prognosis for the patient a more favourable one. I have now watched him for over seven months, and he keeps perfectly well.

EDM. HANSEN GRUT (Copenhagen). Conjunctivitis *Æstivalis*—Spring Catarrh. *Nordisk Ophthal. Tidsskrift.*, 1888, *Hefte* 1—2.

This disease has hardly received the attention which, on account of its importance and its obstinate nature, it deserves. Of more complete references to it in literature, I am only acquainted with those in Græfe-Sæmisch's Handbook, and Arlt's "Clinical Treatise on Diseases of the Eye." The description in Græfe-Sæmisch is very deficient. Arlt mentions Vetsch, Horner, and Reymond of Turin, as those who first properly described the disease. Arlt's description is particularly good, but there are some points on which he has not laid sufficient stress, and to which I shall refer in the following pages.

The disease begins in spring or summer with subjective symptoms, similar to those accompanying conjunctivitis; the secretion, however, is slight in amount. An injection, generally circumscribed, is seen in the pericorneal conjunctival and sub-conjunctival vessels. Small greyish semi-transparent nodules, which when touched with a probe are found to be of a cartilaginous consistency, then make their appearance on the conjunctiva, surrounding the cornea. More frequently, instead of isolated nodules, there is a continuous strip of swollen infiltration in this situation. This swelling is always sharply defined, and though the apparent size of the cornea becomes thereby more or less irregularly diminished, it remains perfectly clear. The immediately surrounding portion of the ocular conjunctiva loses its transparency and assumes a whitish coloration.

The accompanying conjunctival injection and the subjective symptoms (slight photophobia, pricking sensation, and inability to continue long any work near at hand) undergo exacerbations and remissions during the course of the affection, but continue, as a rule, throughout the whole of the summer. They become less in winter. The infiltrations then flatten down or may completely disappear, but leave at the same time an indistinctness of the limbus conjunctivæ, which causes an irregularity of the corneal

margin. Next spring the attacks reappear, and this state of matters may be continued year after year. The variety just described, in which the disease is confined to the limbus and immediately surrounding portions of the conjunctiva, is undoubtedly the simplest and mildest form of the disease. It is this form alone that Sæmisch describes.

Frequently, when the eyelids are everted, they are found to be the site of a slight pinkish blush. Most commonly the surface of the tarsal portion of the conjunctiva, particularly of the upper lid, exhibits a whitish appearance as if it were covered with a thin layer of milk. In somewhat more severe cases this portion of the conjunctiva is occupied by perfectly flat paving-stone-like granulations, which are in contact at their edges. By compressing the everted lid from side to side, so that the conjunctival surface is rendered markedly convex, the separate granulations spring into prominence. They are separated by deep furrows, into which a fine probe can be passed under the granulations. Each granulation is found in this way to be a flat, mushroom-like swelling on a narrower stalk. They are of very different sizes, some having a diameter on the surface of 1·5 mm. or more, and are of a pinkish colour. Their size and thickness cause the eyelids to become larger and thicker, and to droop as they do in trachoma. At the first glance the patient indeed exhibits an undoubted resemblance to one suffering from trachoma. These paving-stone-like granulations are, at all events in the more severe cases, the most characteristic phenomenon of the disease; it is, therefore, extraordinary that Sæmisch does not allude to them at all, and that only a few words are devoted to them by Arlt. These granulations also diminish in size in the cold season of the year, without, however, altogether disappearing, and again exacerbate in summer. At the very warmest time they sometimes assume enormous dimensions, but always remain flat.

Undoubtedly the disease is very frequently mistaken for trachoma. It is, however, distinguished from that affection both pathologically and clinically.

It may arise in the corneo-scleral junction without affecting the mucous membrane of the lids or—and this, at all

events, is most frequent here—in the lids alone, without occurring in the former situation. Occasionally it is found in both places ; but even where the actual granular condition of the lid is absent it is common, where the disease has existed for a considerable time at the limbus conjunctivæ, to find the palpebral mucous membrane smooth and milky-looking. It is probable that this white condition of the mucous membrane is the final stage ; a more or less pronounced formation of granulations may have preceded it unobserved, but this is not always necessarily the case. As I have said, it is the granular formation which especially deserves attention ; this it is which renders the disease so obstinate. Besides the distinctly flat shape, it has certain peculiarities which sharply distinguish it clinically from trachoma. The trachomatous granulations never lose their rounded surface, and there are no deep furrows between them. Trachoma ends in cicatricial formation ; deep-seated linear cicatrices. Trachomatous infiltration penetrates the tissues of the mucous membrane and infiltrates the tarsus, and this causes it to undergo changes in form leading to entropion and trichiasis. This never takes place in the case of the paving-stone-like granulations. When the affection even after many years' duration has passed off, the mucous membrane is smooth and white, but there are never any actual cicatrices, or alterations in the shape of the tarsus.

A long-continued trachoma almost always gives rise to pannus. In the case of the disease under consideration, the cornea, on the other hand, is never affected. From a prognostic point of view this is worthy of notice, and it clearly shows that trachomatous pannus does not arise mechanically from the friction of the uneven surface of the lid against the cornea ; because in the case of the paving-stone-like granulations the thickening of the eyelid and the size of the granulations may be much more considerable than they are in trachoma, and without the cornea ever being affected. Further, it is not any difference in hardness which occasions the difference in the condition of the cornea. The paving-stone-like granulations are unusually hard, so much so that the tissues on being cut away with scissors give rise to a sharp sound. Nevertheless the cornea remains unaffected.

The paving-stone-like granulations never occur on the lower eyelid, which is altogether unaltered ; at most there may be seen here the white coloration already referred to, but this is much less pronounced than on the upper lid. In the case of a trachoma that is at all pronounced, it is the rule, on the other hand, that it, either in the form of separate granulations or as a diffuse infiltration, also affects the lower lid, change in the shape of which from cicatricial contraction is therefore seldom altogether absent. I have mentioned above that, though the flat granulations diminish in winter, they seldom altogether disappear in cases where they are at all pronounced.

The disease is, as a rule, excessively chronic, and resists all the agents mostly employed in its treatment ; but, on account of its much more superficial nature and site, compared with trachoma, one sees exceptionally that even pronounced cases, after having lasted for many years, may be recovered from in the course of an incredibly short space of time, without leaving any trace, with the exception of the whitish coloration referred to. The following case is a remarkable example of this :—

Miss Von S. consulted me in 1866. The affection of her eyes had at that time lasted several years. There were pronounced large flat granulations in both upper eyelids. All local treatment had failed. During the winter the symptoms were less severe, the granulations less ; during the summer there were occasionally very severe exacerbations. She then consulted Von Graefe in Berlin, who treated her for a couple of months without the least effect. During the following summer I was frequently obliged to cut away, sometimes in masses, the largest granulations. This always brought about considerable improvement, which, however, only lasted for some weeks, when the granulations again grew, often worse than they had been before their removal.

This state of matters went on for a number of years. Towards the end of the seventies she was married. She gave birth to a child, and recovered from a serious puerperal fever, during which she had maniacal attacks, which increased to such an extent that, as soon as it was possible to remove her, she was sent to an asylum.

On her return, after several months, I saw her again, and the granulations, which had existed to an unusual extent for sixteen to eighteen years, had disappeared, without leaving a trace. Just the ordinary smooth, white appearance of the otherwise normal mucous membrane was to be seen ; not a cicatrix, notwithstanding the frequently repeated and very thorough abscissions. Since that time there has been occasional irritation during the summer, but never any recurrence of the granulations.

That acute puerperal conditions might react in a striking manner on existing chronic disease is of course nothing new, but I confess that I had to such an extent accustomed myself to look upon her granulations as an unavoidable condition, that I had not dreamt of the possibility of their disappearance in so short a time.

In its pathological anatomy the disease is also distinguished from trachoma.

I have repeatedly had opportunities of examining the structure of granulations I have removed.

Like other observers, I have found that they consist of an epithelial proliferation, along with considerable hyperplasia of the superficial layers of the mucous membrane. In this respect there is no likeness to trachomea, the deep-seated nature of which is characteristic.

It may be said that I have dwelt unnecessarily on the clinical differences of this disease and trachoma, but experience has shown me that even by no means inexperienced ophthalmologists have overlooked this difference. I frequently find patients with the characteristic whitish coloration of the mucous membrane who have informed me that a long time ago they have been treated for Egyptian ophthalmia. I have always found the affection in both eyes, and, although it is not of very rare occurrence here, the number of my cases has not been sufficiently large to admit of any conclusion as to the influence of sex on its occurrence. I have always found it in not very young children and adults under 35. As to its cause or relation to any diathesis, I can say nothing.

It has been generally supposed that the affection has

some close relation to the warmer seasons of the year, and comes and goes with them ; hence its name.

I have already remarked that the granulations, at all events, do not disappear in the winter. It is doubtful indeed if the summer exacerbations which certainly take place constitute the most characteristic phenomena in connection with the affection. The same holds good of other chronic diseases of the conjunctiva ; phlyctenular conjunctivitis flourishes in the spring and summer. The severe exacerbations of trachoma also take place during the warmest summer weather. Heat, with dry air and dust, certainly acts as an irritant to a mucous membrane disposed to inflammation. It is probably no longer held that Egypt is the home of trachoma ; but, among other circumstances, the frequency with which the inhabitants of that warm and dry climate suffer from diseases of the conjunctiva has greatly contributed to such a view.

Has the disease a microbiotic origin ? So far nothing is known in this respect. Its particular bacterium will no doubt some day be discovered, or at all events will be supposed to be discovered, and we shall then not be astonished that heat favours its development.

The peculiar milky appearance which the mucous membrane assumes must probably be looked upon as the final stage of the disease, occasioned by an opacity of the compressed epithelium. It is not, at all events, properly speaking, a cicatricial formation in the mucous membrane. It is the protracted course of the disease more than its actual danger which makes it disagreeable. I am inclined to think, however, that the cause of its great chronicity is mainly to be looked for in its often being mistaken for trachoma, and the sufficiently active treatment being on that account withheld. The ordinary topical agents are altogether inefficacious ; besides, if we are tempted, owing to the chronicity, to make use of strong local applications, such as sulphate of copper, or even nitrate of silver, we may thereby actually do harm.

The diseased epithelium and hyperplastic layer of mucous membrane must be destroyed, in order that we may conquer the tendency to constant relapse.

The chief means of doing so is Paquelin's cautery. The round infiltrations in the limbus conjunctivæ are readily, thoroughly, and permanently acted on by this method. The destruction of the flat granulations of the tarsus is more difficult if they have attained a considerable size. A thorough snipping off of each granulation must first be practised, getting well at the pedicles with the scissors by compressing the lid from side to side, so as to cause the granulations to spring forward; after this, and at the same sitting, the cautery may be thoroughly applied. Snipping off the granulations alone produces a temporary relief, but they afterwards spring up larger and stronger than before. As a rule, the treatment requires several sittings, as all the granulations cannot well be cut away at the same time. By means of this treatment I have been able to arrest cases of many years' duration. It is the superficial character of the granulations which renders it possible to adopt a treatment of this nature without giving rise to extensive cicatrices. It would be impossible to make use of the same treatment in trachoma.

G. A. BERRY.

A. VERDESE. A contribution to the Anatomy of Ulcus Serpens of the Cornea. *Arch. d'Ophthalm.*, VII. 6, p. 526.

This paper is a record of a careful examination of an eyeball given to the writer by Prof. Salvioli. No clinical history of the case is supplied, but it is evident from the description that the cornea was affected by serpiginous ulceration. At the time of examination by Verdesse the eye had been in alcohol for about a year. The results of his investigations seem to throw light upon several points in the pathological anatomy of this affection.

The ulcer was situated near the upper margin of the cornea, and measured 2 mm. in diameter. It was shallow, involving in its deepest part only one-third the thickness of

the cornea. The corneal parenchyma was everywhere infiltrated with lymphoid cells, this infiltration being most intense close to the ulcer, but even here not sufficient to mask or destroy the characteristics of the connective tissue bundles, except in that portion directly beneath the floor of the ulcer, and that forming its lateral boundaries.

Immediately underneath the centre of the ulcer, between Descemet's membrane and the most posterior layers of the corneal tissue proper, was a microscopic abscess, and Descemet's membrane was broken at this point. The lower border of the rupture projected into the A. C., while the upper was lost in the abscess, and had become finely granular in appearance. At a point not far distant, corresponding to another small abscess in the corneal tissue, Descemet's membrane though not ruptured had a similar appearance, suggesting that this degenerative change preceded the break in its continuity.

At the site of rupture in this membrane, a small collection of leucocytes, entangled in a fine fibrinous reticulum, stretched into the A. C. Elsewhere the membrane and its posterior epithelium were perfect.

Fontana's spaces and the iris angle generally showed considerable accumulation of lymphoid cells; this was most noticeable at the lower part; the cells extended among the fibres of the ciliary muscle, and, to a slight extent, into the ciliary processes.

The iris was normal in appearance. The A. C. was filled by a finely granular amorphous material, with threads of fibrin. No lymphoid corpuscles were observed in this material, but they were present in little groups between it and the posterior epithelium of the cornea, especially in the sections of the lower part of the cornea.

The facts to which Verdesse draws special attention are those bearing on the production of the hypopyon, about which there has been much diversity of opinion among writers. The iris has generally in these cases been credited with a large share in its formation, but Verdesse thinks it plays no part, and considers the hypopyon in his specimen to have been derived entirely from the small abscess which, in consequence of the rupture in Descemet's membrane,

opened directly into the A. C. In this supposition he is probably correct as the iris proved to be free from inflammatory changes, but we must remember that in many cases of serpiginous ulcer there is undoubted iritis, and in these there is strong probability that the leucocytes in the aqueous owe their origin, in part at least, to the inflamed iris.

The author alludes to Ciaccio's description of pores in Descemet's membrane, through which cells might pass from the cornea to the A. C., but decides against their existence, he having failed to find any indication of them after treatment of corneæ by the methods employed by Ciaccio. He also accepts the statement supported by almost all writers hitherto that Descemet's membrane offers an unsurmountable barrier to the passage of cells from the cornea into the anterior chamber. It seems likely, however, from the experiments of C. Hess (*Trans. Heidelberg Ophth. Congress*, 1887, p. 37), of which Verdesse does not seem to have been cognisant, that leucocytes can penetrate this membrane, at least in some of the lower animals. Whether they do so in the human eye in sufficient numbers to give rise to hypopyon is very doubtful, and it seems not improbable that the condition found by Verdesse may be the true explanation of the formation of hypopyon, in many cases of serpiginous ulcer, in which, as in his specimen, the destruction of corneal tissue is comparatively superficial, and there is no accompanying iritis.

J. B. L.

BADAL (Bordeaux). A case of "Psychical Amaurosis." *Arch. d'Ophthal.*, March—April, 1888.

The case here recorded at extreme length certainly is one of the strangest yet reported of so-called hysterical amaurosis, the group which, in the complete absence of knowledge of their pathology, we must at present consider as functional disorders of some part of the brain. The patient was a middle-aged woman, who, during her first pregnancy, suffered profoundly from puerperal eclampsia, delirium, albuminuria (passing off after the birth of the child), and œdema of the legs. On recovery from this condition she was left very weak and anæmic, but with no motor or sensory paralysis which could indicate organic disease of the brain. But from the time of her recovery from the delirium it was noticed that her vision was greatly impaired; she could neither feed nor clothe herself, nor could she write or read. The latter statement is to be taken in a qualified sense—occasionally she named correctly letters of very small type, but could not read them consecutively, although a few words familiar to her previously (such as the name of her husband) were still recognised. The field of vision was limited at first to 10° above and to the equator below, *i.e.*, in each eye there was inferior hemianopsia with concentric narrowing of the half remaining. Under treatment (quinine iron, galvanism, and good diet) the field enlarged to 30° upwards, but the hemianopsia persisted. Nor did the other symptoms improve materially during the five months that she was under care. Her sense of hearing, and that of taste and smell were but little if at all lowered; but the most extraordinary symptoms were presented with regard to the estimation or sense of space. She could hardly distinguish on which side of her a noise was made, in attempting to walk she fell against the furniture, etc., although her muscular power was fair, and her central visual acuity was considered to be perfect by Dr. Badal; and when two objects were placed in a vertical line, she seemed quite unable to distinguish which was the higher. Her memory was greatly impaired, although in some points her intellect seemed to be

good. The fundi were frequently examined and appeared to be quite normal. Although there was no diplopia, it seemed impossible to make her fix an object with her eyes for more than a moment or two. Dr. Badal sums up the case as one presenting "alexia, agraphia, inferior hemianopsia, and extreme defect in the sense of space." The patient seemed most anxious to be cured, and there was no sign of hystero-epilepsy; hypnotism was tried on several occasions without effect. It should be noted, as having possibly some share in the causation, that at the time of the delivery she lost a large amount of blood, and that she had been kept under chloroform for over three hours. Somewhat analogous cases are to be found in the works of MM. Féré, Charcot, and Oppenheim.

J. HUTCHINSON, Jun.

PANAS (Paris).—Spontaneous Hæmatoma of the Orbit. *Arch. d'Ophthal.*, March—April, 1888.

At the meeting of the French Surgical Congress, in March, Panas read notes of a case of spontaneous recurrent extravasation of blood in the orbit. His patient was a male child, æt. 4 years, apparently healthy, and with nothing of importance in the family or personal history, save that the child had been liable to attacks of epistaxis.

When seen by Panas, January 20th, the left eye was considerably protruded and displaced a little downwards, and its movements were limited; the pupil dilated and fixed; eyelids swollen and œdematous, but without any discolouration. No perception of light in this eye; ophthalmoscopically the papilla was pale, its edges slightly hazy, and the retinal veins engorged and tortuous. The proptosis could not be diminished by pressure; nothing suggestive of new growth could be felt in the orbit, but fluctuation was distinct. The proptosis had existed for fifteen days.

An incision was made under chloroform, between the lower inner edge of the orbit and the globe; when carried to a depth of two to three cm., very dark liquid blood

escaped ; microscopical examination proved that the extravasation was recent. The cavity was washed out, drained and dressed antiseptically.

A recurrence of hæmorrhage occurred two days later, giving rise to marked exophthalmos, which increased in degree for two days. There was no fever. On Feb. 3rd, the patient had a sharp attack of vomiting, followed on the 6th by three attacks of epistaxis at intervals of four and two hours. This gave rise to an anæmic condition, and the next day severe diarrhœa ensued. From this date onwards the patient slowly improved ; the eyeball returned to nearly its normal position and regained its movements. No recovery of sight ensued, but the pupil regained its consensual reaction.

In his remarks, Panas mentions three somewhat similar cases (Fischer, Wharton Jones, Zehender), these being all he has been able to find recorded. Two were in adults, and one of these (Wharton Jones) in a patient dying of Bright's disease. The third was a child, one year old, described as "liable to hæmorrhages."

Panas believes that in his case, the repeated epistaxis, the hæmorrhage into the orbit, and attacks of anorexia and sickness, to which the child was liable, were all symptoms of gastric derangement. He thinks the child, albeit so young, was the subject of severe attacks of dyspepsia, evidenced chiefly by the vomiting and loss of appetite, and noted that the epistaxis generally coincided with the vomiting. The stomach was found by examination to be considerably dilated, so much so as to give an undue prominence to the abdominal walls.

The orbital extravasation had not been caused by the efforts in vomiting, as it came on during sleep.

In the absence of a condition of hæmophilia, the author is inclined to consider the orbital hæmorrhage and the epistaxis, which latter is a frequent occurrence in young children, as "reflex vaso-paralytic manifestations in dyspeptic subjects, and dependent upon the gastro-intestinal disturbance"; and he expresses the hope that further observations upon such cases, and they are apparently very uncommon, will be published by those who may chance to meet with them.

J. B. L.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

FRIDAY, JULY 6TH, 1888.

J. W. HULKE, F.R.S., President, in the Chair.

Reported by DR. JOHN ABERCROMBIE.

Vernal Conjunctivitis.—Dr. Adolf Bronner (Bradford) related three instances of vernal conjunctivitis. In the first, a boy aged 10, the typical changes described by Sämisch and others were present on the limbus corneæ, and conjunctiva of the upper lid. In the second, a youth of 18, the limbus only was affected. The third patient was a woman, aged 30; the limbus was much affected, and the conjunctiva of the upper lid slightly. He did not regard vernal conjunctivitis as a separate disease, but rather as a hypertrophic form of chronic conjunctivitis, not rare in children, and generally classified under follicular conjunctivitis.

On Hæmorrhage after Iridectomy.—Dr. Bronner also made a short communication on a suggestion by Dr. Bell for preventing hæmorrhage into the anterior chamber after iridectomy. It consisted simply in placing the iridectomy scissors in boiling water just before use. This was often efficacious, but in some cases, especially cases of glaucoma, there was, nevertheless, abundant hæmorrhage.

Embolism of the Retinal Artery cured by Massage.—Dr. Mules related the case of a young woman, aged 21, who perceived a blank over a portion of the upper segment of her right visual field. Within an hour she was at the Manchester Eye Hospital. Her right visual field was found contracted above. Seen under direct ophthalmoscopic examination, the fundus showed a blocked lower retinal artery, the clot, which was colourless, being visible, and extending from the entrance on the disc to the first bifurcation; the plugged vessel looked as if it had been stuffed with cotton wool. The retina was slightly œdematous. Massage was tried, and the clot disappeared, sight at once improved, and the vessel was seen well filled. Certain difficult points of

diagnosis and pathology were submitted to the members for explanation. Charts taken by McHardy's perimeter, by Dr. Griffith, Dr. Roberts, and Dr. Mules, were shown, explaining the course of the field changes. The patient's physical condition was normal.

Dr. Money asked what evidence there was that this was a case of embolism. He further asked whether the patient was the subject of migraine, as in cases of nerve storm of that character vascular spasm was well known.

Dr. W. J. Collins asked whether there was leukæmia, and thought that, if so, the white appearance might have been due to the clot being entirely composed of leucocytes.

Mr. Frost thought that the white appearance was not due to the clot, but to emptiness of the vessel.

Mr. Jessop wished to know what was the condition of the vessels beyond. He had seen a somewhat similar case about two hours after the occurrence. He had tried nitrite of amyl, but without improvement.

Dr. Abercrombie referred to a paper by Mr. Priestley Smith on the association of spasm of the retinal artery with uterine or ovarian disorder, and asked whether this might not have been of that nature. He thought that the condition described was unlike embolism.

Dr. Mules, in reply, said that his first idea was against the theory of embolism. Dr. Graefe, whom he consulted, considered it undoubtedly a case of embolism. Professor Hirschberg thought that the appearance was due to aggregation of white corpuscles, and that the embolism was further back. It was noteworthy that the massage was completely effectual in removing the clot. A year previously the patient had a similar occurrence, and recovered at once upon rubbing her eye. The patient was a very healthy young woman, not subject to migraine, and free from menstrual disorder.

Secondary Hemorrhage after Iridectomy for Glaucoma.
—Dr. Rockliffe contributed notes of a case of secondary hæmorrhage after iridectomy for glaucoma. Mrs. D., aged 56, the subject of chronic glaucoma, had iridectomy performed at 11 a.m. on March 17th, under cocaine. The wound was dressed with eserine and cotton-wool. She drove home—a

ride of ten minutes—and remained well until 5.30 p.m., when sudden hæmorrhage set in. A large clot protruded through the iridectomy incision. The eye was enucleated on the third day.

Mr. Hulke asked what anæsthetic had been used. The hæmorrhage was too early to be called secondary.

Mr. Lawford said cocaine was used.

Mr. Simeon Snell had had a case of severe hæmorrhage soon after iridectomy; the eye shrank, but was not removed.

Mr. Gunn thought the case one of exaggerated hæmorrhage like those more numerous ones in which extravasation occurred between the retina and choroid.

Mr. McHardy agreed with Mr. Gunn, and said that he did not perceive what good there was in leaving the globe after such an accident had happened. The accident only showed how necessary it was to avoid any exertion on the part of the patient after iridectomy for glaucoma.

Partial Ophthalmoplegia.—Dr. Rockliffe also communicated a case of this occurring in a clerk, aged 23. There was dimness of vision and pain in the right eye when looking at near objects. Eserine and spectacles +1 D were prescribed. Eighteen months afterwards internal strabismus of the right eye, with diplopia of one week's duration, occurred. The vision was normal, with homonymous diplopia. Both pupils were widely dilated and fixed, but the range of accommodation of the left eye was six inches. There were no other symptoms. Iodide of potassium, the intermittent current, and mercury, were prescribed. There was a remarkable toleration for mercury and iodide.

Card Specimens.—The following card specimens were shown: Mr. Jonathan Hutchinson, jun.: Traumatic Choroiditis.—Mr. Marcus Gunn: Closure of Perforated Corneal Ulcer by Transplanted Conjunctiva.

Annual General Meeting.—The business of the annual meeting was then taken, the Secretary reading the report of the Council, which showed that the roll of the Society had now reached 218 members, the highest number yet attained. The report referred to the share taken by the Society in promoting the Donders Memorial Fund.

On the motion of Mr. Power, seconded by Dr. Stephen Mackenzie, the report was adopted.

The President then read a letter from Professor Donders, warmly thanking the Society for the kindness shown him by the members, and transmitting a medal struck in commemoration of the Donders Testimonial celebration.

The Treasurer (Dr. Ord) presented the balance-sheet, duly audited.

The ballot for the election of officers and Council for the ensuing session was then taken, and, on the proposal of the President, a hearty vote of thanks was recorded to the retiring Secretary, Dr. Sharkey.

RECENT LITERATURE.

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Arch. d'Ophtal., May-June, 1888.

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Klin. Mon.-Bl. f. Augenheilk., May, 1888.

DE WECKER. Pourquoi le décollement de la retine guérit-il si difficilement ?

Société Française d'Ophtalmologie, Paris; May, 1888.

B. UVEAL TRACT. VITREOUS AND AQUEOUS. LENS.

BELT. Report of one hundred Cataract Extractions, in which bandages were excluded from the after treatment.

Archives of Ophthal., XVII. 1, March, 1888.

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Lancet, June 23rd, 1888

- FUCHS. Ueber traumatische Linsentrübung.
Wiener Klin Woch., Nos. 3 and 4, 1888.
- HEDDAEUS. Ectopia lentis, atrophische Zonula, Vierfachsehen.
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Archives of Ophthalm., XVII. 1, March, 1888.
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- HERNHEISER. Ein Fall von Symblepharon multiplex. Heilung.
Prager med. Wochenschrift, No. 37.
- SAMELSOHN. Ueber Erblindung nach entzündlichem Blepharospasmus der Kinder.
Kl. Mon.-Bl. f. Augenheilk., June, 1888.
- SILEX. Ueber perforirende Wunden der Cornea und Sclera.
Berl. Klin. Wochenschr., No. 20, 1888.
- TANGEMAN. Keratitis bullosa.
Archives of Ophthalm., XVII. 1, March, 1888.
- WIDMARK. Sur la fréquence de l'Ophthalmie des nouveau-nés en Suède.
Revue Gén. d'Ophtalmol., April, 1888.

D. ACCOMMODATION. REFRACTION. MOTOR APPARATUS.

CHAUVEL. De la Myopie : ses rapports avec l'astigmatisme ; étude statistique et clinique.

Arch. d'Ophthal., May—June, 1888.

CHOUET. De la Skiascopie (ancienne Kératoscopie). Théorie et application.

Recueil d'Ophthalmol., April, 1888.

LEROY. Méthode pour déterminer par l'Ophthalmomètre l'astigmatisme cornéen.

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TWO CASES OF DISLOCATION OF THE CRYSTALLINE LENS.

BY C. KNOX SHAW,

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The following cases of incomplete displacement of the lenses present some points of interest, and may, therefore, be worthy of record. The first case is probably congenital in origin; the second was the direct result of traumatism.

CASE I.—*Symmetrical Incomplete Dislocation of the Lenses*.—E. F., a married woman, aged 55, has been under observation since May, 1886. Her health has been good, but her sight has always been defective, and has certainly deteriorated considerably during the last three years. She does not remember at any time having received an injury to the eyes. There is no family history traceable bearing upon the condition of the eyes. When first looking at the patient, one is markedly impressed with the extreme shallowness of the anterior chambers, the irides being apparently in contact with the corneæ. The pupils are small, and the right elliptical in shape; they react readily to light, and are not tremulous. By oblique illumination the lenses show faint striæ. Tension is normal. The fundus is visible in each eye; the optic discs look hyperæmic. B. E. $v = \frac{6}{6}$; with the R. E. she reads Sn. 1.25, holding the book close to the eye, but she is unable to read the largest type with the L. E. After using atropine the pupil becomes imperfectly circular; there are no synechiæ. Vision was not improved by the use of

lenses, either before or after the use of atropine. The appearance is very similar to the diagram (Fig. 1), illustrating Mr. Priestley Smith's paper on "Lateral Dislocation of the Lens," etc., in Vol. II., p. 257, of the *Ophthalmic Review*. When the iris is fully dilated, the upper and inner (nasal) portion of the equator of the lens is just visible, and appears to protrude through the pupil. The lens is rotated on its own axis, the axis of rotation being 45° , and the movement of rotation is sufficiently great to cause the margin of the lens to present into the pupillary area.

Direct ophthalmoscopic examination reveals both lenses to be numerous and finely striated and fibrillated; the left the more so. A narrow streak of bright reflex can be obtained between the equator of the lens and the margin of the iris. The position of the lenses has not changed since the patient first presented herself, but the lenses themselves have very slowly become more striated.

CASE II.—*Incomplete Traumatic Dislocation of the Left Lens*.—I. M., æt. 45, was seen January 25th, 1888. Eight months ago, whilst chopping some wood, he received a violent blow on the outer side of the left eye. This does not seem to have affected his eye very much at the time, but caused him to suffer excessive pain in the eyeball, which was only relieved by the administration of quinine. Since the accident the sight of that eye has not been so good as formerly, and, as he expresses it, it seems as if he were always "looking through a globule of water" in the eye.

The anterior chamber of the left eye was deeper than the right. The outer half of the iris was markedly tremulous. Upon dilating the pupil with atropine, the lens was readily seen to be partially dislocated from its outer attachment backwards into the vitreous. Percussion of the eyeball caused the unattached portion of the lens to oscillate. Coming from the outer portion of the equator of the lens, and passing from behind the

edge of the iris just into the anterior chamber, was a thin, colourless, filmy material, its free extremity floating in the aqueous upon movement of the eyeball. A bright concentrated light was required to see it well. An explanation offers itself that this may have been bundles of fibres of the zonule of Zinn torn from their ciliary attachment by the blow. The lens capsule did not present any appearance of having been lacerated, and the lens itself was quite clear.

GOWERS (London). *A Manual of Diseases of the Nervous System.* 2 vols. pp. 463 and 975, 8vo. London: J. and A. Churchill, 1886 and 1888.

Second Notice.

Gowers commences his first volume with a short introduction on the classification of diseases of the nervous system, and states that such a classification, at once scientific, exact, and convenient for systematic description, is not at present possible. He attempts, however, to formulate a classification which, although not convenient for systematic description, does, he believes, help us to obtain clearer views of the primary relations of disease. The classification he adopts is into (1) *Organic disease*, or coarse organic disease, such as tumour, hæmorrhage, softening; (2) *Structural disease*, such as most forms of sclerosis; (3) *Nutritional disease*, such as general paralysis of the insane, paralysis agitans, chorea; and (4) *Functional disease*, such as reflex convulsions, and many forms of hysteria. In the first class, he says, the morbid process always begins outside the nerve elements themselves; in the second class it may begin within or outside them; in the third and fourth classes these elements are probably always primarily affected. It will be noted that in this classification a new group, termed nutritional diseases, has been introduced. We venture to think that Gowers has given no sufficient reason for this subdivision; that, moreover, the introduction of such a

term as designating a group of diseases, distinct on the one hand from those previously termed functional, and on the other hand from those termed organic or structural, is to be deprecated. It gives a definite name where there is no corresponding definiteness of ascertained fact, and we think it is well he has made no use of his classification. The groups of diseases called functional have in the various departments of medicine become of late years small by degrees and beautifully less. This is in the way of progress, and we may expect that the process will continue. In the proper sense of the term there can be no such thing as functional disease. It is merely a convenient term, indicating a group of diseases the physical basis of which has not yet been ascertained. So soon as this basis has been ascertained it passes into the group of diseases termed organic. Gowers makes the element of transiency the ground of distinction between nutritional and functional disease, but he admits that this distinction does not serve to separate them, and it in no way separates structural from nutritional disease. Gowers *seems* to state that there are "diseases that consist only in a disturbance of function," with no physical basis whatever. Of this there is no proof, and the gradual reduction above referred to in the number of "functional" diseases goes in the opposite direction. The last stronghold of this belief, namely, the group of phenomena called inhibitory, seems to us to have fallen in consequence of recent physiological observation, and Gaskell's introduction of the terms anabolic and katabolic, to indicate the nutritional changes occurring during inhibition and stimulation, will probably do something to eradicate the belief, which has played a larger part in the diseases of the nervous system than in any other department of medicine.

We have already reviewed those portions of Dr. Gowers' work that are of direct and special interest to the ophthalmic surgeon, but ophthalmology and neurology are so closely interwoven at so many points that no part of either of the volumes can be indicated as devoid of interest for those specially concerned with affections of the eye. This is especially true of the second volume, the first part of which we have already considered. The whole of the chapter

on diseases of the cranial nerves will well repay to the ophthalmic surgeon a careful perusal. The chapter finishes with a section on the localisation of cerebral disease, giving a clear and succinct account of the facts of our knowledge on this head from a diagnostic point of view. The same applies to the section on diseases of the cerebral meninges, a class of cases in which the ophthalmic surgeon will very frequently be asked for an opinion. The following paragraph is of much importance:—"Among diseases of the nervous system, one that sometimes gives rise to considerable difficulty in diagnosis is intracranial tumour. A rapidly growing tumour, especially one that at first interferes little with function, may cause symptoms which develop so rapidly as to be easily mistaken for those of meningitis. This is the case sometimes with tubercular tumours, and with glioma of the pons, which may run an almost latent course until they have reached a considerable degree of intensity. The symptoms in the limbs often assist the diagnosis, since the loss of power is more often an early symptom in tumour than in meningitis, and it comes on gradually in the former, whereas early paralysis of the limbs in meningitis usually comes on suddenly from irritative inhibition. The ophthalmoscopic appearances are of great importance. A slight degree of neuritis may be due to either tumour or meningitis; but an intense neuritis, with considerable swelling and hemorrhages, is practically conclusive of tumour. The neuritis of a rapidly-growing tumour is usually intense, and when the appearances are slight at first, if the disc be watched for a few days the course of the neuritis often decides the diagnosis. It must be remembered that from the absence of neuritis no conclusion can be drawn." A question of some importance for the ophthalmic surgeon is discussed in this section, namely, the prognosis of meningitis. As might be expected, the author draws a clear distinction between local or traumatic meningitis on the one hand, and general purulent meningitis on the other. Recovery from the latter condition is, he says, practically unknown, although he has twice known recovery from distinct symptoms of meningitis in post-puerperal septicæmia. Recovery from local or

traumatic meningitis does take place, and even with regard to tubercular meningitis he says: "The fatality of the disease is great, but cases of recovery from what is apparently tubercular meningitis are observed in young adults more frequently than in children. Doubt always hangs over the exact nature of cases that recover, but the probable evidence as to the tubercular character of some of these cases is very strong." At post-mortem examinations one not unfrequently finds such matting of meninges as indicates a past meningitis, of which there is no history, and such a meningitis may explain some of the cases of apparently causeless optic atrophy which do not react to any treatment. In a recently recorded case of death from purulent meningitis after excision of an eye, there was indubitable proof that the brain had at a remote period recovered from a severe attack of basic meningitis.

The remainder of the work, forming the greater part of the second volume, is divided into two sections: first, that dealing with organic diseases of the brain, including the cerebral degenerations; and second, the largest and in some ways the most important part of the work dealing with the general and functional diseases of the brain. As we have already said, it would be futile to attempt anything like a detailed review of a work which deals with such a multiplicity of subjects, and which, moreover, consists of practically a series of monographs on these subjects. Take, for example, the section on cerebral hæmorrhage occupying pp. 35. It shows throughout the author's usual carefulness of observation and clearness of statement. Even the question of the age of incidence of cerebral hæmorrhage is discussed with thorough actuarial mastery of statistics. Where all is so good it seems almost invidious to select, but if asked to indicate the strongest and most valuable portions of this division of the work, we should have no hesitation in mentioning the sections on occupation neuroses, on epilepsy and on hysteria. We venture to think that in the more directly practical part of the work there is nothing better than the account of the symptoms and treatment of writer's cramp. The section is important, as much from a prophylactic as from a therapeutic point of view; and altogether we are sure it will be

welcomed by all who have been asked to do their best for any of these unfortunate cases. The sections on epilepsy and hysteria give the ripe results of an unusually large experience in comparatively small space.

In closing our review, we most heartily congratulate Dr. Gowers on having produced a work of which English medicine is justly proud, which has raised even his reputation as a physician and a master of English style.

J. A.

R. DEUTSCHMANN (Hamburg). Pathology of Diabetic Eyes. *v. Graefe's Archiv f. Ophth.* XXXIII. 2, p. 229.

Deutschmann describes the appearances found post-mortem in the eyes of four individuals who died while suffering from diabetes mellitus.

(1.) A girl of 20, with bilateral diabetic cataract. Cornea normal, anterior chamber containing small fibrinous clots, enclosing numerous free pigment granules, and also small pigment masses. Posterior chamber same contents, and also nucleated pigment cells. Zonula intact, with free pigment granules. Lens swollen, capsule uninjured. A homogeneous layer of coagulated albumen lying in contact with internal surfaces of anterior and posterior capsule, thickest at the poles. Fibres partly normally placed, partly pushed aside by large irregular masses of albumen. The nuclei partly normal, partly in a state of molecular disintegration, as were also most of the more peripheral lens fibres. The vitreous full of fibrinous clots. The uveal layer of iris exhibiting a proliferation of its pigment cells, which were turned into cylindrical shapes, with the pigment irregularly scattered about their interior. Nuclei partly pigmented and partly non-pigmented. This proliferating layer of cells nearly completely disjoined from the subjacent layer (which was also in a state of proliferation), being merely attached by delicate threads full of pigment granules. The

iris tissue exceedingly atrophic, especially in the region of the iris root. This proliferation of the pigment cells spread back to the ciliary processes, but in diminished intensity; the retinal pigment epithelium being also in parts detached from the choroidea by a finely granular exudation, and a similar exudation in places separating the pigment epithelium from the retina. Some connective tissue hypertrophy in the retina, and some proliferation of the cells of the pars ciliaris.

(2.) A girl aged 13. Diabetic cataracts submitted to several dissection operations. The same post-mortem appearances in the eyes as in case 1, except that the lenses presented differences due to the operations, and subsequent absorption of portions of the cataracts.

(3.) Eyes successfully operated on for diabetic cataract two years before death. Pathological appearances similar to those seen in the preceding cases.

(4.) A man, aged 19, with bilateral diabetic cataracts springing from the posterior surfaces. Pathology essentially the same as in the other three cases.

Micro-organisms searched for in vain in all four cases.

The most remarkable feature in all the four cases was the proliferation and œdematous swelling of the layer of pigment cells of the posterior surface of the iris. A similar observation has been made by Becker, and also by Kamocki at the Heidelberg Congress in 1886. In addition to this process, which extended in a lesser degree to the pigment epithelium of the retina, the atrophy of the iris root with increase of its nuclei and connective tissue, and escape of the pigment into the anterior and posterior chamber, were the important pathological appearances.

From these observations Deutschmann concludes that either a long-continued hyperæmia or else actual inflammation of the iris must have existed, with an accompanying proliferation of its layer of pigment cells. This must have been an altogether insidious process, which led to connective tissue hypertrophy and consecutive atrophy without clinical symptoms.

The condition of the retina lends probability to this hypothesis. The precise cause of this process is uncertain,

and Deutschmann contents himself with asserting that it stands in some as yet unknown connection with the diabetic dyscrasia. He calls attention to the tendency which the epithelial structures exhibit towards necrosis in diabetes mellitus, and points out the analogy between the changes which occur in the lens and in the cells of the pigment layer of the iris.

Case 2 exhibits well the changes which occur after discission. The edges of the ruptured capsule rolled outwards, the capsular epithelium proliferating, the lens fibres finely granular and opaque. Throughout the lens substance large leucocytes containing myelin, which cells are regarded by Deutschmann as the principal agents in effecting the absorption of the disorganised lens fibres after discission.

The so-called vesicular cells (*Blasenzellen*) were present in these, as in all other cataractous lenses examined by Deutschmann. He considers these to be merely nucleated lens fibres which have been enlarged and swollen, and whose contents are in a state of finely granular opacity, therein differing from Becker, who regards them as living cells developing under abnormal conditions.

All the lenses exhibited the peculiarities described by Becker in the reaction of the nuclei of the cells to staining fluids, and the molecular disintegration of the nuclei themselves. Every stage was represented from healthy, normally stained nuclei to complete disorganization, the latter being the commonest phenomenon. From this Deutschmann concludes that the lens (a purely epithelial structure) owes its opacity in diabetes to the same necrotic tendency that is shown by all epithelial tissues in this dyscrasia. So long as the epithelium which constitutes the lens is alive and healthy, no pathological process of diffusion takes place, no matter though both aqueous and vitreous contain sugar; but when necrosis of the lenticular cells begins, abnormal diffusion currents are set up (just as in the cadaver), which produce opacity and swelling of the lens.

J. B. S.

SCHMALL (Königsberg). Retinal Circulation and Arterial Pulse in General Disease. *v. Graefe's Archiv XXXIV. 1., p. 37.*

Rählmann's paper in Virchow's Archiv (Bd. 102), "The Retinal Circulation in General Disease of the Vascular System," has furnished the occasion for this article. Schmall touches first on the normal appearances seen in the retinal vessels ophthalmoscopically, their size, walls, colour, and pulsation, and takes the diameter of the optic disc as the standard for judging the size. He reminds us that the walls are not always invisible in normal eyes, and that the colour of the blood is often influenced by the character of the wall of the vessel. Arterial pulsation has been observed in healthy individuals; the explanation given by Becker is that accepted by Schmall—viz., a peculiarity in the arrangement of the vessels which opposes unusual obstacles to the incoming blood stream. Venous pulsation is, of course, a familiar retinal phenomenon, and is best explained by Donder's well-known theory, which assumes that the intra-ocular pressure during the passage of the pulse wave compresses a portion of the vein sufficiently to check the flow of blood in it, the vein filling again as the pulse wave subsides and the intra-ocular pressure decreases. This intra-ocular pressure is the pressure of the fluid in the tissues, and whether it depends simply upon the blood pressure, or is connected with the action of certain specific secretion cells, is a point which Schmall considers has not been as yet satisfactorily determined. Increase of this intra-ocular pressure is known to produce venous pulsation (or increase it if it is already visible), then to diminish the size of the veins, and set up arterial pulsation, before it finally empties the retinal vessels. If moderately high pressure be suddenly relaxed, a dilation is observed both of arteries and veins, but this dilation is much more marked in the latter than in the former. Schulten (*vide Ophth. Rev.*, Vol. IV., p. 50) has explained this by supposing that a temporary vasomotor paralysis, induced by the diminished blood current, produces the subsequent dilation; but Schmall thinks the more probable cause is the loss of correspondence between the

intravascular pressure and the suddenly reduced extravascular pressure.

The principal changes in the retinal vessels which have been observed in various cardiac lesions are embolism in recent endocarditis, as well as septic retinitis resulting therefrom ; changes in size and colour of retinal vessels, and abnormal pulsation. Venous and also arterial hyperæmia has been described in congenital lesions of the right side of the heart, communication between the ventricles and advanced valvular disease. Schmall has only had an opportunity of observing the latter class of cases, and he states that retinal hyperæmia in such is one of the rarest possible occurrences. In this he corroborates Leber's view, that congenital cyanosis is the only affection producing general venous hyperæmia which usually causes also retinal hyperæmia. Whether the cyanosis in these valvular diseases was of the anæmic or the hyperæmic variety, the retina was found by Schmall almost always unaffected. As he considers the hyperæmic cyanosis is due to a local paralysis of the vessels of the skin, it is easy to explain its non-occurrence in the retina in most cases, while its presence may be regarded as a sign of paralysis of the retinal vessels.

Schmall has always found the relative size of the retinal veins and arteries unaltered in cardiac lesions when compensatory cardiac hypertrophy is absent. While in these cases it is known that the blood pressure in the larger veins of the body is, relatively to that of the arteries, distinctly increased, it is probable that the over filling of the abdominal viscera with venous blood prevents this venous hyperæmia being exhibited in the retina. The arterial anæmia which is found in such cases he has not unfrequently observed in the retina.

As regards arterial pulsation, he has observed it eleven times among thirty-eight cases of cardiac lesion. In all eight cases observed of aortic insufficiency it was present. It was seen in two cases out of twenty-two of mitral disease, and in one case of total pericardial adhesion with dilation of both sides of the heart. An ophthalmoscopic drawing is given of one case of supposed atheromatous degeneration of retinal artery and consecutive aneurism.

Schmall's observations upon the retinal vessels in acute febrile conditions agree in the main with those of Edward Jæger ; but in two cases of croupous pneumonia he observed pulsation in the retinal arteries, also in one case of rheumatic fever, and one of pleurisy. A tabular statement is given of twenty-one cases of typhoid fever, which shows that Jæger's views are not generally applicable to that fever at all events ; for neither were the arteries and veins proportionately dilated, nor the colour of the venous blood altered in a very large proportion of the cases. Schmall often met with narrow arteries and dilated veins, the darkness of the venous blood being well marked. This venous dilation he is disposed to attribute to the lowering of the intra-ocular pressure in the course of the fever. In five of the cases arterial pulsation was noticed. In phthisis, Schmall has often observed a more or less lively injection of the fundus oculi, with arterial pulsation in five cases.

But little has been published upon the state of the retinal vessels in anæmia with the exception of Jæger's observations and Rählmann's article quoted above. Jæger observed contraction of the whole vascular system of the retina with a loss of colour of the venous blood, which he described as an hyperoxyæmia. Rählmann found retinal anæmia only in some 20 per cent. of the cases of chronic anæmia ; while in from 57 to 63 per cent. distinct retinal hyperæmia was present, in about two-thirds of which arterial pulsation was visible. Schmall found very frequently the retinal vessels perfectly normal in anæmia ; and when abnormal appearances were present both arteries and veins were commonly affected. The changes seen were either defects in the colour of the blood with no alteration in the size of the vessels, decrease of size of vessels alone, or both defects combined. The colour changes were altogether due to the relative increase in the size of the veins compared with the arteries, and only in one case of chlorosis was anything corresponding to Jæger's hyperoxyæmia observed. The veins were relatively enlarged, rarely tortuous, the arteries very frequently tortuous. The venous dilation Schmall considers due not to the general anæmia, but to local conditions. It may be present in one eye only. Schmall observed arterial pulsation

in twenty out of fifty-five cases of chlorosis, the pulsation being usually in the form of locomotion seen at the bends of the vessels.

Rählmann's explanation of this arterial pulsation assumes some peculiar retrograde movement in the local or general circulation, such as is known to occur in aortic insufficiency, or aneurism. He attributes to different causes the venous pulsations seen in neurasthenia, anæmia (after hæmorrhage, in exophthalmic goitre, or in chlorosis), venous congestion, alterations in the walls of the vessels, and in retinal exudation (Trübung). His cases, however, are almost exclusively those of highly anæmic individuals; and Schmall does not follow him in these minute distinctions, and also refuses to see any essential difference between the pulsation manifested as a locomotion of the vessel, and that exhibited as a transverse distension.

The arterial pulsation produced by Rählmann in the retina of dogs by the injection of large quantities of salt solution into the veins has been also observed by Schmall. The latter attributes the phenomenon to the increased force of the cardiac contraction, and not to the increased mobility of the watery blood column, as has been done by the former. Consequently, Schmall rejects Rählmann's explanation of the pulsation seen in anæmia generally (viz., hydræmia), and attributes it to "a certain extent of cardiac contraction combined with sudden relaxation of the heart muscle occurring in certain states of low arterial tension," and is unable to assign any important diagnostic or prognostic value to the phenomenon.

J. B. S.

M. DUFOUR (Lausanne). Erythropsia. *Ann. d'Ocul.*, T. XCIX., p. 135.

Dufour reports four cases of this affection, three of which occurred after cataract operations, and the fourth in a girl of seventeen suffering from chronic glaucoma, after the performance of large iridectomies. The erythropsia appeared in the evening of a bright day after a fall of snow, and lasted till nearly noon of the next day. This phenomenon persisted during the whole time that the ground was

covered with snow, and from his observations Dufour is able to state that the erythropsia was approximately proportional to the length of time the patient was in the open air ; that it never appeared till between five and six o'clock p.m. ; that towards midnight it disappeared if the artificial light was faint ; that the use of eserine, by contracting the pupil, rendered it less intense, or prevented it altogether ; and that its presence did not prevent the perception of coloured objects, nor diminish the ordinary acuity of vision.

Dufour cites a number of cases which have been published by other observers. Of these, one group is characterised by the appearance of the symptom towards evening, after an exposure to a bright light, in individuals whose lenses had been extracted.

A second group contains those cases in which the lens was *in situ*, the exciting causes being various ; such as the instillation of atropine, hysteria, rage, psychical excitement, or violent exercise.

Erythropsia has been attributed to the following causes : —(1) The absence of the lens ; (2) the perception of the visual purple ; (3) fatigue of the blue percipient elements of the retina ; (4) hyperæsthesia of the red percipient elements ; (5) fatigue of the central organs of vision.

The absence of the crystalline lens renders visible the ultra violet rays, which are usually absorbed by the normal lens. The rays of the violet end of the spectrum are chemically the most active, and are also most fatiguing for the retinal elements which perceive blue and violet. The fatigue of these elements naturally produces erythropsia.

Dufour, however, rejects this explanation as it does not account for the cases which occur in individuals whose lenses are intact. He also rejects the hypothesis of Szili that certain conditions of illumination produce a hyperæsthesia of the red percipient elements, as it is opposed to the general principle that sensitiveness of a nerve is increased by rest, and diminished by exercise.

The theory of the perception of the visual purple is too far-fetched for discussion, and Dufour is inclined with Hubert Berger and Purtscher to localise erythropsia in the cortical centres of vision.

J. B. S.

BRITISH MEDICAL ASSOCIATION.

Fifty-sixth Annual Meeting, held at Glasgow, August, 1888.

SECTION OF OPHTHALMOLOGY.

THOMAS REID, M.D., President, in the Chair.

Reported by KARL GROSSMANN, M.D.

Wednesday, August 8th.

The Chairman opened the meeting of the Section with a hearty welcome to those who, in spite of the counter-attraction of the Congress at Heidelberg, held simultaneously, had come in large numbers to the famous old University of Glasgow, dear especially to ophthalmologists by the memory of Dr. Mackenzie. He then called upon Mr. Brudenell Carter to open the special *Discussion on the Treatment of Senile Cataract*.

Mr. Brudenell Carter read a paper in which he gave his individual mode of operating with all details. In commencing, he pointed out that different operators were not only entitled to try different methods of operating, but would also obtain the best possible results by cultivating a mode which best suited their individuality. For ripening an immature cataract, Mr. Carter performs a preliminary iridectomy. While in former times absolutely and strictly adhering to a deep narcosis by ether or chloroform, he now uses exclusively cocaine (in wafer made by Savory and Moore), preceded by eserine. As for antisepsis, a careful cleaning of the instruments follows each operation, and dipping into absolute alcohol precedes a fresh operation. The sponges are disinfected by Condy's Fluid and sulphurous acid. Boroglyceride (15 per cent.) is used for the conjunctival sac. The upper lid is retracted by an assistant by means of a Noyes' speculum, the lower lid by the operator's finger, and the conjunctiva is laid hold of in the vertical meridian immediately below the cornea. A very narrow Græfe's knife,

such as von Wecker uses, is oiled with the fingers, and an almost scleral incision is made upwards. An iridectomy is performed in all cases, as facilitating the delivery of the lens and its cortical remnants, as preventing the bruising of the iris, and, lastly, as reducing the dangers after the escape of vitreous. According to Mr. Carter, an iridectomy should always be performed, because iridectomized eyes show so often normal vision, and because those who, as a rule, do not perform iridectomy, resort to it in difficult cases. After the iridectomy, the anterior capsule is opened in the usual way and the lens squeezed out. Neither McKeown's mode of removal of cortical masses nor antiseptic irrigation of the anterior chamber is applied. After a final instillation of boroglyceride, both eyes are dressed with a vaseline rag and ordinary cotton-wool dipped in water, tied up with Liebreich's knitted bandage, to which three pairs of tapes are attached. Two days afterwards the operated eye is examined and the other eye is left free; after a week, the bandage is removed altogether. Later on, any remaining capsular, cortical, or iritic obstructions are treated either by needling or by iridotomy scissors. For glasses, Mr. Carter likes Franklin's lenses.

Dr. T. S. Meighan said it was often very difficult to decide when to operate, the cataract not being always mature. In such cases he performs a preliminary iridectomy downwards. Four to six weeks later, the extraction is done with a small Beer's knife, downwards. Iridectomy is always to be preferred as preventing the dreaded prolapse of the iris into the wound.

Dr. Lloyd-Owen considered it of the greatest importance to wash out the conjunctival sac with a concentrated solution of boracic acid. He avoids sponges altogether, as extremely dangerous; absorbent cotton-wool, damped with boracic solution, is used instead. The corneal incision ought to be large and adaptation of the wound easy. For this purpose he turns the knife up before finishing the wound, thus forming a "trap door" cut. He also approves of oiling the knife. Preliminary iridectomy has hardly any advantage compared with iridectomy performed at the time of the extraction.

Mr. C. G. Lee reported the results obtained by him after irrigation for removal of cortical matter, subsequent to expulsion of the nucleus. Twenty-one cases in all were reported.

Of these	10	obtained	$\frac{20}{30}$
	3	"	$\frac{24}{40}$
	6	"	$\frac{20}{50}$
	1	"	$\frac{20}{70}$
	1	"	Jaeger 14.

In six of the cases the cataracts were immature when operated upon; and a contrast was drawn between the results obtained by employment of irrigation in this class of cases, and six reported by Mr. Higgins recently in the *Lancet*. Mr. Lee further stated he always performed iridectomy, as an almost necessary precursor to irrigation. In none of his cases had vitreous escaped, nor had any iritis been set up by irrigation. Distilled water had always been employed.

Mr. H. B. Hewetson advocated the omission of iridectomy in uncomplicated senile cataract as a superfluous operation. He held that the good success of Drs. Roosa, Knapp, Teale, and others fully shows this; also that the circular pupil is an advantage, and corrects greatly the astigmatism resulting from the corneal incision. For dressing the eye, Mr. Hewetson uses salufer-wool (silico-fluoride of sodium), and ordinarily the eye is left undisturbed for a week. He recommends that the operator should keep his mouth shut during the operation, as his breath and his saliva may be the carriers of septic infection. The "trap-door" incision had given him every satisfaction, the wound closing splendidly, and patients very often leaving after the fifth day. The operation without iridectomy was not, in his experience, followed by traumatic iritis from the supposed bruising of the iris, and iris prolapse was a very rare complication.

Dr. Grossmann considered as essential for an effectual antisepsis, firstly, absence of conjunctivitis and dacryocystitis secretion; and, secondly, the most scrupulous cleanliness. Which antiseptic to apply was of very little importance; he was satisfied with perchloride of mercury. The principal point in the discussion was the question, iridectomy or no iridectomy. For more than a year he had completely

abandoned iridectomy. Brought up in the orthodox German school, he was not afraid hereby to violate the memory of von Græfe, who, if he lived now, would probably himself be the first to leave off iridectomy in all suitable cases. The results had been very favourable. Dr. Grossman said he could not see the logic in Mr. Carter's remark that iridectomy should be the rule without exception for uncomplicated cases, because in complicated cases iridectomy was resorted to even by anti-iridectomists. It was better to leave the iris intact and thus to prevent escape of vitreous altogether, than to console one's self with the idea that iridectomy was a good thing after the escape of vitreous, facilitated by the iridectomy itself. Traumatic iritis from stretching the pupil had not yet been proved beyond dispute. A movable pupil gave a great deal of comfort to the operated eye, by its adaptability to and reaction against light. The question of subsequent astigmatism greatly depended on the individual mode of operation, and comparisons between the results of different operators were easily misleading. Before each operation, preparation should be made for iridectomy, in view of the possibility that the operation may eventually seem advisable. Cases have to be taken on their individual merits, and to extract in all cases without iridectomy would be just as indiscriminating as to lay down the rule: no extraction without iridectomy.

Mr. S. Snell, notwithstanding Mr. Carter's remarks, eulogized the value of the plaster method in the after-treatment of cataract, and had found it very useful during the last two years. He, too, thought iridectomy quite superfluous in many instances, and operated now without it in the majority of his cases. His antiseptic precautions were very rigid, but the main point was cleanliness.

Dr. J. R. Wolfe was in favour of iridectomy. It enables a better removal of the cortical debris, to which latter all failures are mainly due. He makes a small iridectomy downwards a fortnight previous to the extraction. The corneal incision, the size of which is made according to the anticipated size of the lens, is not finished, but a bridge is left and the speculum withdrawn. A blunt-pointed Græfe's knife is then introduced to complete the incision, and the

lens removed by pressure on the upper eyelid. Dr. Wolfe has never yet used cocaine, and does not use chloroform either.

Mr. Henry Power pointed out the difficulty of obtaining reliable statistics, and how misleading some of them were, as almost involuntarily a certain selection is made in choosing cases for operation. He would not dwell on any particular method or instrument, as all yielded good results ; he would only urge to make the wound large enough. He used cocaine, and all instruments were carefully cleaned. Four years ago he considered iridectomy indispensable ; since then he had altered his opinion, probably influenced by the introduction of cocaine, which allows a more deliberate procedure. The two advantages claimed for iridectomy are : the prevention of iris prolapse and the ready removal of the cortex. Now, prolapse of the iris had, Mr. Power held, become a very rare occurrence indeed, and, as for the cortical remnants, Mr. Carter not only said he often used needles for lacerating the capsule after the operation, but he actually had constructed scissors to sever thick cortical obstructions, which, therefore, are not prevented by iridectomy. Mr. Power would, therefore, continue to operate without iridectomy, and to preserve the round pupil which was the normal state in the healthy eye.

Mr. Teale had abandoned iridectomy since 1873, except in special instances. He introduces a narrow triangular Beer's knife into the horizontal meridian of the cornea, and carries it right through ; but as soon as the counter-puncture is made he abruptly turns the edge of the knife forwards and finishes his incision, so as to get a flap angular in profile. From his description, this procedure appears to be rather a violent one, but Mr. Teale claims for it an easy expulsion of the lens, and a very close adaptation of the wound with very good final results.

Mr. McHardy had also discarded iridectomy generally. He introduces the point of a narrow knife into the anterior chamber, going straight for the lens capsule, which he opens before making the counter-puncture. By this method he tries to form an opinion of the size and consistency of the cataract, so as to measure the length of the wound accord-

ingly. He uses, with every satisfaction, Foerster's method of ripening an immature cataract, which, after three to six weeks, is invariably ready for extraction.

Thursday, August 9th.

A contribution to the study of Hemianopsia of central origin, with special reference to acquired Colour-blindness.

—Dr. George Mackay introduced his paper with some remarks on the compound nature of the visual sense, which, for the sake of practical convenience, was to be regarded as composed of the light-sense, form-sense, and colour-sense. Their relative importance was indicated, and reference made to the necessity for investigating the condition of each of these perceptions, not only in the central parts of the visual field, but also in the periphery, in order to obtain a proper knowledge of their integrity.

The visual disturbance accompanying lateral homonymous hemianopsia may vary in two ways :—

I.—*In the extent of the field affected.* According to what extent the cerebral or nerve-substance of the visual nerve apparatus is involved, there may be a small homonymous scotoma, a sector-like defect or loss of the entire half-field. The hemianopsia is accordingly incomplete or complete in extent.

II.—*In the degree of visual loss.* This is seldom investigated with the care it deserves.

If all three perceptions are lost at any part where they should normally be present, the hemianopsia is absolute. In many cases the loss is partial, a variable amount of perceptive power remaining.

It has been asserted that there have been two main varieties of these partial (or relative) cases :—

I.—Cases where the colour-sense has been lost, but the form-sense and light-sense remained intact.

II.—Cases where the colour and form senses were lost, leaving the light-sense intact.

The former group is supposed to be represented by a few cases recorded under the title of "hemiachromatopsia."

Samelsohn, Swanzy, and Gowers, among others, have stated, with more or less confidence, that these cases, or some of them, prove the existence of a separate centre for colour. Wilbrandt has largely based on the same conclusion his theory of the hemiopic centre.

A tabular analysis of these cases accompanied the paper, showing that, according to the published records, these cases had not been examined with the precision and completeness necessary to substantiate the assertions made, and that the only one in which other senses beside that of colour were not clearly involved was that of Samelsohn. Even this one is not above suspicion. The patient's central vision was not previously normal, and his hypermetropia and presbyopia must have added to the difficulty of testing accurately his peripheral form-sense. The examination of his light-sense was admittedly incomplete. Dr. Mackay had been led to make this inquiry from observations made on four cases of partial hemianopsia recently under his care.

He exhibited the results obtained in one of these which was at first regarded as a case of pure colour-defect, but which, on investigation with more delicate test objects than ordinarily employed, showed also a decreased form-sense.

He pointed out the fallacy of regarding the field for white as a measure of the light-sense, and illustrated from one of his cases the importance of inquiring into the patient's power of perceiving and distinguishing white and black peripherally before employing a test object for the form-sense based on the contrast between them. He admitted the want of a satisfactory test for the light-sense in the periphery, and concluded with the statement that, while the facts adduced did not support the special centre theory in the manner asserted, they did not justify a direct negative.

He drew attention to this subject in order to ask for a more careful study of cases of hemianopsia of all kinds in relation to the degree of visual loss, as much light might thereby be thrown upon the nature of the visual sense as well as on cerebral localisation.

Mr. Hewetson said he suffered from hemianopic troubles at times. In the right half of both retinæ he suddenly perceived something "like an electric discharge," which

was accompanied by total loss of vision in that half of the field. Severe pain in the parietal regions followed, and vision gradually reappeared.

Dr. Grossmann fully appreciated Dr. Mackay's valuable paper. As for Mr. Hewetson's symptoms, they seemed to belong to that very frequent functional complaint, scintillating scotoma. In years gone by he had been himself subject to this affection, and in his case it has always been the beginning of a violent one-sided headache (hemicrania). It had disappeared for the last ten years quite by itself.

Dr. Mackay was also of opinion that such cases were functional. Still they deserved as careful investigation as those due to grosser lesions.

Unusual Corneal Opacity in process of Recovery.—Mr. Bickerton showed the patient, demonstrated in 1886, at the Brighton meeting. More than a fourth of the cornea had lost its transparency by a yellowish opacity, the convex margin of which, partly covering the pupil, was now clearing up a little. The cornea was not altered in shape, the epithelium was quite normal and healthy. Nothing had been done to the eye.

Dr. Grossmann, who had seen the patient only once (before the Brighton meeting), said he had not changed his opinion, and thought the opacity looked like a deposit of urates or phosphates, or it might be fat, but that the only way of coming to a correct diagnosis would be to cut a bit out and examine it microscopically. It certainly was no neoplasma.

Mr. Bickerton believed, with Dr. Wigglesworth, it was a case of scleroderma.

Sailors and their Eyesight.—Mr. Bickerton said the deficiency in the eyesight of sailors, as being a factor in the causing of shipping disasters, was well known, and had already been well discussed. Some time ago Mr. Nettle-ship had said further general statements would hardly be

of any use, and it now only remained to collect facts about disasters that had really taken place. Acting on this suggestion, Mr. Bickerton had been able to find two such instances of collisions, of which full details were given. He also thought that, in all probability, the loss of H.M.S. *Vanguard* had been due to the defective eyesight of one of the look-out men.

Colour-blindness with Demonstration of New Tests.—

Dr. Grossmann, in opening his paper, remarked that it was desirable the *laity* should be convinced of the dangers arising from the employment of colour-blind people in the railway and marine services. Partly for this purpose, and in order to facilitate the detection of colour-blindness, he had made the tests to be laid before the meeting. Confining himself to red-green blindness, he remarked that if two different colours which appear alike to the colour-blind eye are so combined that the one forms a pattern on a ground of the other, such pattern will not be distinguishable to the colour-blind. It was Stilling's great merit to employ this principle in his pseudo-isochromatic plates; but, although his idea was excellent, his plates are, for reasons to be seen presently, in many cases unreliable.

Dr. Grossmann gave the name of "twin-colours" to two different fundamental colours, which appear identical to the colour-blind eye. Such twin-colours are green and yellow, dark-green and brown, brown and red, etc. For brilliancy of colours Berlin wools were employed and letters embroidered similarly to Cohn's modification of Stilling's plates. To some of these twin-colours a third fundamental colour could be found, identical for the colour-blind, and for such a set of three colours the name of "triplet-colours" was used; for example, green, yellowish-brown, and red. But while a certain green and brown is a twin-colour for all red-green blind individuals, the red is not equally identical to all; both for twin and triplet combination it often fails, appearing to some darker, to others lighter, than the corresponding green or yellow. Dr. Grossmann found that the principal reason for this peculiarity was the difference which exists in different

colour-blind individuals as to perceiving rays of various lengths. Some Daltonists see the spectrum shortened at the red end, others see it of normal extension. None of his patients had a gap in the green part of the spectrum. Those whose red end of the spectrum was shortened, perceived a certain red darker than others, whereas the green-yellow twin-colours appeared alike to all. This was utilized for a three-coloured test in this way. On a brown ground a P was embroidered in red, and a green tail (\vee) completed this P to R. The colours were so chosen that they appeared a triplet to those whose spectrum had normal extension, whereas those with a shortened spectrum saw the letter as a dark P on a light ground. This explains why Stilling's plates give so often wrong results, and shows also that red is not to be relied upon in twin-coloured test combinations. Another reason is the variability of daylight, affecting the red differently from the other colours.

The wools, however, though very handy, are soon soiled and apt to fade very rapidly. For this reason, Dr. Grossmann selected twin-coloured glasses, and cut these into very small squares. Out of these glass squares a simple mosaic pattern or letter was formed, and placed between two sheets of plain glass. The whole was so arranged as to form a slide, to be put into a lantern in which an oil lamp was burning, thus imitating exactly the conditions of a signal lamp. He showed two dozen such slides, some of which were equally serviceable for daylight and lamplight, some for lamplight only, some for daylight only, some containing three colours. In order to make the daylight slides serviceable for lamplight, a pale greenish-blue glass was to be placed between lamp and slide, while a yellowish glass is used to convert the "lamp-twins" into "day-twins." As there were no such colours to be had at any glassworks, he had stained some glasses himself. One of the slides was composed of signal-red and green glass. These glass squares have the great advantage of never fading, nor can they be easily destroyed even if the slide breaks. He also gave statistics of nearly a quarter of a million of railway employés, and finished by advocating the introduction of examination for colour-blindness into boys' schools and by urging the

periodical repetition of such examinations for railway servants and seamen.

Dr. Reid asked whether there was any defect in the spectrum in the green part when the red was shortened, and whether there was a limit for the restriction of the shortening of the spectrum within which the triplet-coloured test could be applied.

Dr. Grossmann replied that in none of his cases had there been a defect in the green. The triplet-coloured test had been so selected that it was intended for those whose spectrum had normal length; all others saw a dark P.

(Conclusion in next Number).

AMERICAN OPHTHALMOLOGICAL SOCIETY.

TWENTY-FOURTH ANNUAL MEETING.

Held at New London, Conn., July 18th and 19th, 1888.

President: DR. WILLIAM F. NORRIS, OF PHILADELPHIA.

Reported by DR. EDWARD JACKSON.

Action was taken commemorative of Drs. C. R. Agnew and E. G. Loring, of New York, and Joseph Aub, of Cincinnati, members who had died within the year.

Membranous Opacities of the Vitreous.—Dr. C. S. Bull (New York) reported the results of tearing through such opacities in seventeen eyes of fifteen patients. While opacities due to hæmorrhage often undergo retrogressive changes, opacities of this kind show no tendency in that direction. They often veil the whole region of the macula, and they endanger the retina by tension, tending to cause detachment; while a case operated on by Græfe, and confirmed by several cases of this series, showed that the division of such an opacity tends to bring about its more or less complete absorption.

To perform the operation, the eye is put thoroughly under the influence of cocaine, and an ordinary keratonyxis needle, a double-edged needle, or in very dense opacities, a narrow Graefe knife, is introduced just in front of the equator of the eye-ball and below the insertion of one of the lateral recti, usually the external. The opacities in the posterior part of the vitreous are the more easily reached. The reaction is usually very slight, except where some inflammatory process is present. A protective bandage for two or three days and the use of atropia constitutes the after treatment.

Among the seventeen eyes, the operation gave improved vision in fourteen, and failed to do so in three. In eleven the vision was doubled, or more than doubled. The greatest improvement was from 1/200 to 20/70, and from 3/200 to 20/50. Nearly all of these cases had the history of previous deep inflammation, but it was important to wait until all inflammatory symptoms had subsided before attempting surgical interference.

Dr. G. Strawbridge (Philadelphia) was glad to learn that no eye had been lost by the operation, and that it had not been necessary to actually watch the division of the opacities with the ophthalmoscope. He had found the use of the ophthalmoscope while operating difficult and unsatisfactory.

Dr. W. S. Dennet (New York) had used the ophthalmoscope to operate on the fundus of the eye, with great satisfaction.

Dr. S. Theobald (Baltimore): Were antiseptics used, and were the membranes divided by a simple sweep of the blade, or with a sawing motion?

Dr. Bull: Antiseptic precautions were observed in all cases. Any sawing motion was avoided, for fear of enlarging unnecessarily the scleral wound.

Dr. W. F. Mittendorf (New York) thought that vascularity of these membranes should contraindicate such operative interference. Vascular membranes usually undergo more or less complete absorption spontaneously; and the division of the vessels would cause hæmorrhage, which might prevent a satisfactory result.

Pulsating Exophthalmos cured by the Ligation of the Common Carotid.—Dr. F. Buller (Montreal) had seen four cases of this character. One of these had been reported. Another was that of a man thrown from a horse upon hard ground. There was enormous swelling, and a harsh bruit. The carotid was ligatured, but he afterwards died of epistaxis. In a third case there was a depressed fracture of the frontal bone, and atrophy of the left optic nerve. This patient also died of epistaxis. The autopsy showed a fissure of the base of the skull, and a direct passage from the left carotid to the nostril. The fourth case, the especial subject of this report, was that of a man twenty-three years old, in very good health, who fell about twenty feet, striking the right side of his head and face. He remained unconscious for twenty hours. On regaining consciousness, he noticed a loud beating sound in his head. The pain and swelling slowly subsided, and when he was able to open the right eye again, he noticed diplopia. About two weeks before he was first seen the swelling had begun to increase, and the pain had become very severe, and difficult to relieve with drugs. The ophthalmoscope showed œdema of the retina, and swelling of the retinal veins. Vision was 20/100. The pupil dilated and immovable, the eye-ball displaced outward .5 and forward .6 of an inch, and moving with every pulsation of the heart. Pressure over the right carotid caused diminution and softening of the swelling, and cessation of the pulsation and bruit. The diagnosis was made of arterio-venous aneurism. The common carotid was ligated by Dr. Shepherd. The pulsation and bruit ceased immediately, with marked diminution in the swelling. At the end of ten days, when the dressings were removed, the wound was found to have healed entirely. The improvement in the position and movements of the eye-ball was steadily progressive. Vision rose from 20/100 to 20/20. A slight prominence of the eye being the only remaining symptom.

Dr. J. O. Tansley (New York) had seen a similar case, caused by being thrown from a carriage. The sight and movements of the eyeball were lost, and there was a large serous tumour hanging from the eyelid. It was decided not to ligate the artery, and under the internal administration

of potassium iodide there was a very satisfactory improvement.

Dr. W. H. Carmalt (New Haven): Dr. Buller was to be congratulated on the extremely favourable termination of his case; but why did he regard it as one of arterio-venous, rather than simple arterial aneurism? The result was so much better than was usually obtained in the former condition, and more what might be expected in the latter.

Dr. Buller: Simple aneurism of the ophthalmic artery is clinically unknown; there was great hyperæmia of the visible veins, and the bruit and other symptoms were such as have been recognised as due to arterio-venous aneurism.

Dr. C. J. Kipp (Newark) reported the case of a woman aged seventy-three, who, shortly after a fall, had begun to have a great noise in her ears, followed soon after by increasing prominence, first of the right, then of the left eye. When seen some months later, the right eye protruded four-tenths, the left two-tenths of an inch. There was paralysis of the right external rectus. There was no pulsation. The bruit was heard over nearly the whole head. It was lessened by pressure over the carotids, more when the pressure was made on the right. Intermittent pressure of the carotid was directed, but probably not very efficiently carried out; and potassium iodide given internally. In three months the bruit had entirely disappeared; and a month later the left eye had regained its normal position. On the right side the external rectus has regained its power, but there is still slight protrusion of the globe.

Dr. S. D. Risley (Philadelphia) called attention to a case which Dr. Harlan had reported to the society, cured by pressure on the carotid. He had also seen a case of recent exophthalmos with marked pulsation and bruit, in which the pulsation and bruit disappeared on compressing the corresponding carotid, which, however, caused faintness. Compression to faintness was repeated three times at the first visit, and when the patient appeared again, all pulsation and bruit had ceased. Subsequently the eye became normal in appearance, except a slight squint.

The Refraction of the Healthy Human Cornea.—Dr. S. M. Burnett (Washington) reported the results of the ex-

amination with the ophthalmometer of Javal and Schiotz of 576 eyes, belonging to 301 persons. All eyes presenting pathological conditions of the cornea were excluded. The corneal refraction was found to be the same in both eyes, irrespective of their refractive condition, in 110 persons. The horizontal meridian (to within 5°) was the least refracting (astigmatism according to the rule) in 420 eyes. The vertical meridian was the least refracting (astigmatism against the rule) in twenty eyes. In eighty-eight eyes the meridians were oblique. In fifty-eight eyes the difference in the refraction of the two meridians was less than 0.25 D.

In 101 eyes, *emmetropia* was found on examination. The largest number had a corneal refraction of from 44 D. (radius = 7.65 mm.) to 45 D. (r. = 7.48 mm.). The strongest corneal refraction was 47 D. (r. = 7.17 mm.), the weakest, 39 D. (r. = 8.64 mm.).

In fifty-five eyes there was *simple myopia*. The strongest refraction was 47.25 D., the weakest 39 D. The corneal refraction did not, in any considerable number of cases, bear any close relation to the degree of myopia.

Simple hyperopia was present in fifty-nine eyes. Strongest corneal refraction, 46 D., weakest 40.5 D. As with myopia, the corneal refraction gave no indication of the degree of hyperopia.

Simple myopic astigmatism was found in 140 eyes. In four eyes the general astigmatism was greater, and in eleven it was less than the corneal. In fourteen eyes the difference between the axis of the corneal meridian and that of the correcting glass was greater than five degrees. *Simple hyperopic astigmatism* was present in ninety-six eyes. In four eyes the corneal astigmatism was greater, and in two eyes less than the general. The axes corresponded in all but nine eyes.

Compound myopic astigmatism in sixty-three eyes. In all but seven the corneal and general astigmatism corresponded, and the axes were the same in all but four eyes. *Mixed astigmatism*, eight eyes. In four corneal and general astigmatism the same. In two the corneal was less, and in one greater. Axes the same in five eyes.

In forty-two eyes the general astigmatism was against

the rule, while in only eighteen of these was the corneal astigmatism against the rule. Corneal astigmatism is, with few exceptions, with the vertical meridian more strongly refractive.

From the examination of sixty-two eyes under a mydriatic, Burnett feels justified in thinking that many cases of lenticular astigmatism are due to an oblique position of the lens, as was the case in Young's eye. From a study of these statistics, the author concludes that, while the corneal refraction gives no indication of the general refractive condition, the corneal astigmatism expresses in the vast majority of cases the general astigmatism, both as to degree and axis; and therefore the instrument of Javal and Schiotz is one of, if not the best, instrumental means of diagnosing that anomaly. He does not consider astigmatism more likely to lead to progressive myopia than any other form of ametropia.

Dr. H. D. Noyes (New York) had used the ophthalmometer of Javal for three years with great satisfaction. Its findings without atropia, in the immense majority of cases, correspond to the refraction determined under atropia. Sometimes the meridians of greatest and of least refraction are not perpendicular to each other, and the astigmatism is therefore incapable of complete correction. The discovery of this fact with the ophthalmometer will save time that might be wasted in attempts to secure vision equal 1. With the instrument he had found mixed astigmatism more common than he had before supposed it to be. It also revealed notable changes in the corneal curvature due to variations in the pressure of the lids, or in the tension of the ocular muscles. Occasionally the cornea is so thin that there is a perceptible pulsation in the corneal reflex. The corneal does not always correspond to the total astigmatism; but with the ophthalmometer atropia is much less frequently required for the measurement of ametropia.

Dr. S. Theobald (Baltimore): Lenticular astigmatism frequently remains after complete paralysis of the ciliary muscle, which may not be due to any obliquity of the lens, but which may require months to render it all manifest.

Dr. C. Koller (New York, formerly Vienna): In the

great majority of eyes the corneal agrees with the total astigmatism. The influence of the muscles is shown in that you find less astigmatism for near work than for distant vision. The reason that in some eyes the meridians of greatest and least refraction are not perpendicular is that there is a very great angle alpha.

Dr. B. A. Randall (Philadelphia) stated that in the case of rupture of the choroid and partial luxation of the lens he had reported to the Society, where there was 5° of astigmatism, this had disappeared with the gradual return of the power of accommodation. Dr. Burnett's statistics, as to the relative frequency of the different forms of astigmatism, differed radically from those obtained when a mydriatic was used. After a mydriatic the compound astigmatisms were found to constitute 70 per cent. of all cases of ametropia, while Dr. Burnett had recorded the simple astigmatisms as much more frequent than the compound.

Dr. Burnett confirmed the observation of Dr. Noyes as to the influence of the lids on the corneal refraction. He thought any unequal contraction of the ciliary muscle would be allayed by the use of a mydriatic.

Progressive Hyperopic Astigmatism.—Dr. J. B. Emerson (New York) reported a case in a young man whose eyes, previously tested, had shown only a low hyperopia. In 1880 he presented 1.60 of astigmatism in each eye, which had increased from year to year until, in 1887, he required for its correction R. + 1.9 cy. axis 165° , L. + 1.18 cy. axis 180° .

A Cataract-knife—Dr. E. Jackson (Philadelphia) showed a knife, which for 14 mm. from the point, exactly resembled a Graefe knife. It then widened by the addition of a triangular back until 28 mm. from the point it was 6 mm. broad; this portion resembling a Beer knife. With it the puncture and counter-puncture were made as with the Graefe, and the incision completed by a single forward thrust as with a Beer knife. The advantages of this form were: perfect control of puncture and counter-puncture, the smoothness of an incision completed at a single thrust, the retention of the aqueous until the incision is nearly complete, and the counter-extension by the back of the knife, making fixation comparatively easy. The

extractions done with the knife had given very smooth coaptation of the corneal wound, with prompt healing.

Lachrymal Instruments.—Dr. J. O. Tansley showed a set of hollow lachrymal probes, with perforations in the sides, but with solid bulbous ends. With one of these, fluid injected into the lachrymal passage could be prevented from passing downward, and retained in contact with the diseased parts as long as was desired. He also exhibited hollow lachrymal styles with a sharp right angle instead of a rounded curve at the upper end, and with the upper side of the horizontal arm cut away, making the tube quite inconspicuous, though safe from slipping down into the nose.

Dr. S. Theobald exhibited a set of lachrymal probes made of aluminium. This metal was particularly well-fitted for this purpose, being light, non-oxidizable and especially slippery. He had instructed patients to introduce the probes themselves.

Dr. W. F. Mittendorf had employed, to inject the lachrymal passages, a perforated canula, which he attached, not to a syringe, but to a piece of rubber tubing.

Dr. S. D. Risley, on procuring a half-dozen skulls on which to try the Theobald probes, had found that in none of them was the bony canal large enough to admit the number 16.

Dr. Theobald had tested the canal in some forty or fifty skulls, and had found that the smallest canal among them admitted the No. 13 probe; while some would take a probe double the size of the No. 16.

Dr. Tansley also showed a pair of small forceps for grasping the lachrymal puncta, and preventing absorption through the nose and throat of strong mydriatic solutions, such as it is necessary to use in iritis.

(Conclusion in next Number.)

W. EISSEN (Bielefeld).—The Curvature of the Cornea, as affected by Increase of the Intra-ocular Pressure. *Archiv.f.Ophthalmol.*, Vol. XXXIV., Part 2, p. 1, 1888.

This paper deals with the changes of the corneal curvature which occur under increase of pressure within the eye. The author refers to several previous writers on the subject, and records a series of experiments made by himself.

Helmholtz, in his classical work on the accommodation of the eye (Von Græfe's Archives, 1854), states, as a result of his own observations with the ophthalmometer, that the corneal curvature, apart from individual differences, varies with the pressure of the intra-ocular fluids, the radius of curvature becoming greater as the pressure increases.

Schelske, following Helmholtz, experimented on the enucleated eyes of animals and man, and found likewise a more or less definite relation between the curvature of the cornea and the height of the intra-ocular pressure.

Coccius, in a monograph on ophthalmometry and tension-measurements in the morbid eye, published in 1872, states that in the glaucomatous eyes of old people he had found no noteworthy changes in the corneal curvature, but that in early life an increase of the intra-ocular pressure produces considerable flattening of the cornea. Donders also has recorded negative results concerning the effect of the intra-ocular pressure.

Laquer, experimenting upon enucleated pigs' eyes, obtained a considerable flattening of the corneal curvature and an increase of its diameter under an increase of the intra-ocular pressure.

Georges Martin, in the course of his studies concerning astigmatism, arrived at the following conclusions:—

1. In a certain proportion of cases the corneal astigmatism of glaucoma is a variable condition.
2. An ordinary astigmatism (astigmatism *selon le règle*), may diminish or entirely disappear; it may be replaced by a perverse astigmatism (astigmatism *contre le règle*).

3. The degree of the perverse astigmatism may increase as the glaucoma advances.

4. It may diminish if the glaucoma retrogresses.

5. In one case an astigmatism with least curvature in the horizontal meridian, was replaced by an oblique astigmatism.

6. These changes in the astigmatism of glaucoma may serve clinically as indications of the progress of the disease. In certain cases the ophthalmometer thus plays the part of a tonometer.

7. The changes are to be found more especially in the younger patients; they are dependent upon the intra-ocular pressure and the elasticity of the tissues.

8. Perverse astigmatism was met with in 50 per cent. of the cases, and the variations observed in many of them indicate that it is a consequence rather than a cause of the glaucoma.

9. An astigmatism with lowest refraction in the vertical meridian is commonly increased by a sclerotomy or iridec-tomy incision at the upper margin of the cornea. Such incisions diminish, as a rule, the curvature of the vertical meridian.

10. The sudden lowering of visual acuity which sometimes occurs some time after the performance of such operations for the relief of glaucoma may be due to the dilatation of the vertical meridian, and may be corrected by a cylinder.

Pfalz, working independently of Martin, came likewise to the conclusion that perverse astigmatism occurs with exceptional frequency in glaucomatous eyes; he found it in 41 per cent. of these latter, while in non-glaucomatous eyes he found it in less than 3 per cent. Unlike Martin, however, he inclined to the belief that the perverse astigmatism was antecedent to, and to some extent the cause of, the glaucoma, through long continued accommodative strain.

Schoen also has observed the exceptional frequency and the variability of perverse astigmatism in connection with glaucoma.

In the present paper Eissen describes, in elaborate detail, a series of experiments made by himself upon the non-

enucleated eyes of morphinised and curarised rabbits. The changes of corneal curvature were estimated by the ophthalmometer of Javal and Schiotz. The intra-ocular pressure was raised by means of the double manometer previously employed for very precise investigations by Hoeltzke, Graser, and Stocker. The results are exhibited in a series of tables and charts, and may be summarised as follows :

1. The eye of the rabbit presents a physiological intra-ocular pressure of about 24 to 25 mm. of mercury. A slight increase of this pressure alters the curvature of the cornea. In many cases an increase of 5 to 10 mm. suffices to do this. In no case will the eye bear an increase of 25 mm. above the normal pressure without changing its form.

2. The statement of Helmholtz (see above) finds a general confirmation in the results of these experiments. The pressure being raised by successive increments from 25 mm. to 110 mm., the longest radius of the corneal curvature (*i.e.* the radius of least curvature) showed under the latter pressure an average increase of 0.028 mm., the shortest radius (*i.e.* the radius of greatest curvature) showed an average increase of 0.046 mm.

3. Under an increasing intra-ocular pressure, the pre-existing astigmatism presents, firstly, a transient increase, and by higher degrees of pressure a continuous increase.

4. The usual form of astigmatism becomes reversed as the tension of the globe increases, the flatter meridian passing gradually from the horizontal towards the vertical. This change in the position of the astigmatism under pressure affords a probable explanation of the frequency of perverse astigmatism in glaucoma.

5. Among the long series of rabbits' eyes examined, the corneal changes which occurred under pressure were not exactly identical in any two instances, even in the two eyes of the same animal.

P. S.

BRUNS AND STÖLTING (Hanover).—A case of Alexia, with right homonymous hemianopsia. ("Subcortical Alexia," Wernicke). *Neurol. Centralbl.* 1888, *Sept.*, p. 481 and p. 509.

Wernicke has defined Subcortical Alexia as that form of disease in which the capacity of reading is lost, while spontaneous writing is unaffected, and in some cases the patients have been able to read by writing, or at least making the movements for writing what they read. In such cases he has found right homonymous hemianopsia, and he believes that if sought it will always be found. The authors give references to two cases in addition to Wernicke's, and they also quote Batterham's case (*Brain*, 1888, Jan., p. 488), as one coming under this category, although no mention is made of hemianopsia. Batterham's patient could hear well, could understand what was said to her, could converse readily, although occasionally at a loss for a word, but she could not read written or printed characters, and made numerous mistakes in naming letters of the alphabet pointed out to her. She recognised common objects, but could rarely name them, although when the name was given her she recognised and repeated it readily enough. The names of objects frequently occurred to her if she was allowed to handle, smell, or taste them.

In addition to these cases the authors record at length, with general observations on the affection, the case of a man aged 51 years, who on April 20th of the present year became suddenly unable to see to his right side, with at first some disturbance of sensation on his right side, and very soon slight paraphasia, and mental affection, confusion, suicidal ideas, etc. On examination in May, it seemed at first that there was extreme contraction of both fields to something like 10° round the fixation point; but more accurate examination when the patient's attention was fully roused showed that he had typical right hemianopsia, the limiting line lying to the right of the vertical through the fixation point. Motion and sensation were to all appearance perfectly normal,

and the mental symptoms had passed off. Speech was almost perfect, with occasionally slight paraphasia. Objects presented to him he could usually, after some hesitation, name properly, but sometimes he could name them only after handling them, and occasionally he had to describe them—*e.g.*, a thermometer: that is for the weather; a syringe: that is a surgical instrument. On May 28th he was able to read printed letters of the alphabet, and short words, but after this he could no longer recognise printed letters or words. When shown the word table or stool, and asked to indicate the object in the room, he could not do so. Printed Arabic figures he recognised usually at once, but he generally made the figure in the air. Written letters and words he slowly but generally correctly recognised. Some letters he did not recognise, and these he could at once name either in writing them himself, or having them written with his hand passively. Writing, either spontaneously or to dictation, was perfect, but he could not read what he had written the moment before, and had difficulty, even after "writing them over," in naming letters he had himself written, probably from their indistinctness. Although unable to name letters presented to him, he rarely made a mistake in pointing out letters that had been named to him.

Grashey states that there is an aphasia apparently depending on shortness of the sense-impression, and consequent disturbance of perception and association. That this was not the case with their patient the authors proved by showing him a series of objects, which they immediately covered. He knew quite accurately what articles had been shown him, whether he could name them or not. The disease, therefore, they hold, is a special disturbance of memory for printed symbols, and these alone, and this special form of weakness of memory may be termed *Alexia*.

In discussing the seat of the lesion in such cases, the authors begin by postulating that all optical reminiscences (*Erinnerungsbilder*) must be located in the right as well as in the left optical centre. They then show by means of a diagram how the commissural fibres connecting these centres with the sensory speech centre in the inferior parietal lobule and the superior temporo-sphenoidal gyrus of

the left hemisphere may be readily interrupted by a lesion which shall, at the same time, interrupt the left optic tract and thereby cause Alexia with right homonymous hemianopsia, there being no other symptom of aphasia. But this explanation, which is due to Wilbrand, does not show how written words and letters can be recognised, and also why the power of writing is unaffected. After considering various alternatives, they find themselves shut up to the conclusion, that for writing, special fibres must exist between the optic and word centres, which, in the case above recorded, were uninjured, while a single lesion interrupted both the fibres proceeding from the right optic centre to the sensory speech centre in the left hemisphere, and also the fibres of the left optic tract. The "writing" reading is merely a reversed writing, the words being recognised by the revival of the ideas of the movements performed in writing, and this whether these movements are actually performed either actively or passively, or the ideas of the movements are revived merely by the close association of the visible written symbols with the actual movements in writing. The written letters in their nature approach more to concrete objects than do the corresponding printed letters having in addition to the auditory and articulatory memory which they have in common, also a visual and a kinæsthetic or graphic motor memory. The authors note also the interesting fact that alexic patients can read printed Arabic figures, and they explain this by these printed characters resembling the written ones, so that they can be read by "writing" (*schreibend gelesen*), and also by the fact that figures are more concrete than letters, are symbols for whole words and not for single letters. Oppenheim suggests that possibly the figures have a closer relation with the right hemisphere than other symbols.

J. A.

GOLDZIEHR (Budapest). A form of Conjunctivitis Granulosa due to Syphilis. *Centralbl. f. prakt. Augenheilk.*, April, 1888.

The conjunctiva, both ocular and palpebral, is known to share in many of the syphilitic affections of the eyelids, and may itself be the seat of a primary sore, or, more rarely, tertiary gummata. A diffuse inflammatory infiltration of the conjunctiva, however, as a result of general syphilitic infection, has been hitherto undescribed, and if the author's opinion as to the nature of the two cases he describes is confirmed by further observation, we shall be indebted to him for drawing attention to an unrecognised form and cause of conjunctivitis.

Goldziehr's cases were briefly as follows :—

(1.) Male, æt. 32, came under care in June, 1886, with enlarged cervical glands, and affection of the conjunctivæ. He was said to have had syphilis six years previously; no skin affection. Iritis in left eye *three years* later; this relapsed several times, and eventually iridectomy was performed upon this eye. Some time later the conjunctival affection began in the left eye, and, six weeks before admission, in the right eye. The lids of both eyes had been treated by all the ordinary local applications, without any improvement.

(2.) Male, æt. 26, admitted in January, 1887. Two years previously he had been infected with syphilis, and had undergone a course of treatment by inunction. When he came under Goldziehr's care there was "much infiltration" of the infra-maxillary, cervical and inguinal glands, and the left testicle and epididymis were enlarged. In August, 1886 (before the syphilitic infection), there was some affection of the right eye, which was treated for a period of six weeks by the local application of nitrate of silver. No improvement ensued, and subsequent treatment by atropine gave only temporary benefit. When he came under Goldziehr's care the left eye only was affected; the right had throughout kept well.

The condition of the conjunctiva in the two cases was so similar that one description will suffice for both. The lids were considerably thickened, and the skin reddened and rather tense. The lower lid stood out from the eyeball by reason of the swollen conjunctiva, and it is noted as one of the differences between this form and ordinary trachomatous disease, that the lower palpebral conjunctiva is as much affected as the upper. The thickened conjunctiva presented a curious light colour, compared by the writer to honey, and had a peculiar solid (*starren*) appearance, as if bloodless. A considerable number of prominent pale yellowish granulations, most plentiful at the lower fornix of the conjunctiva. There was moderate chemosis with general conjunctival congestion.

Both patients were put upon mercurial inunction, and iodide of potassium given internally. This was followed by rapid improvement in the lids; the granulations disappeared, and the thickened anæmic-looking conjunctiva regained its normal soft vascular condition. No local applications were employed. Though watched for some months, no return of the conjunctival disorder occurred.

It is evident from Goldziehr's description that the appearances in these cases differed considerably from those presented by an ordinary case of trachoma; in favour of his diagnosis also are the facts that the usual treatment by nitrate of silver and like applications aggravated the symptoms, and that a cure resulted from a course of mercury and iodide of potassium. The evidence of syphilis in the first case however, seems, to one reading this account, very weak; the iritis was more like the so-called "rheumatic" iritis.

In case 2, moreover, there was some conjunctival disease (treated by nitrate of silver) at a date antecedent to the syphilitic infection, and it is also noteworthy that the conjunctivitis in this case affected only one eye.

J. B. L.

NIEDEN (Bochum). Amblyopia from Nitro-Benzol poisoning. *Centr. f. prakt. Augenheilk.* July, 1888.

Nieden reports a case of amblyopia, with contraction of visual fields, occurring in a man ætat. 26, who was employed in the manufacture of the explosive compound Nitro-benzol or "Roburit." General toxic symptoms came on after he had been engaged in this work for a few months, and defect of sight soon followed. When he came under Nieden's observation his condition was as follows:—There was marked cyanosis of face and of mucous membrane of lips. Dilated very dark veins in the conjunctiva bulbi; the eyes were lustreless and the expression anxious. Breathing laboured, radial pulse thready, irregular, 148 per minute. A peculiar odour, likened to that of bitter almonds was noticeable in the patient's breath. Auscultation and percussion revealed a normal condition of the lungs; the cardiac dullness was not increased, but there was a systolic murmur. Liver enlarged and tender. Spleen slightly enlarged. Urine normal.

V., R and L $\frac{10}{200}$ and No 11 (Nieden's types). Fields of vision (each eye) upwards 30°; downwards 20°; outwards 25°; inwards 35°. Field for blue smaller than that for red.

Ophthalmoscopic examination. Media clear. Retina and papilla showed marked venous hyperæmia, arteries badly filled. Edges of papilla sharp and distinct except a small sector of the lower border of right disc (inverted image) where there was a patch of exudation surrounding a venous trunk. No hæmorrhages. (This exudation gave rise to a small scotoma in R. field.)

The patient, having left off work, rapidly improved under treatment by cardiac tonics, the eye symptoms recovering more gradually. No improvement in sight was noticeable for one month, but in six weeks he was able to see sufficiently to do his work. The exudation in the right retina became absorbed; the venous turgescence disappeared *pari passu* with the general cyanosis.

Cases of poisoning by the inhalation of Nitro-benzol fumes have been reported by several writers, though but little notice seems to have been paid to ocular symptoms. In the manufactory from which Niden's patient came, in the space of twelve months the large proportion of 25 out of 33 workmen had suffered more or less severely, but no fatal case occurred. Eulenburg* states that 34 per cent. of the cases are fatal.

J. B. L.

PELTESOHN (Hamburg). Retinitis Pigmentosa sine Pigmento. *Centr. f. prakt. Augenheilk*, July, 1888.

The case here recorded is one of considerable interest, and is briefly as follows :—A male patient, ætat. 21, came to Professor Hirschberg's Clinique in April, 1885, complaining that his sight had been slowly deteriorating for two years, and that the defect was much more noticeable in the evening. He was a healthy man, but incurably deaf. No consanguinity in parents. Brothers and sisters (younger than patient) were free from any symptoms of disease. A male cousin ætat. 30, suffered from a similar defect. (There is no record to show whether or no the brothers and sisters and this cousin were examined ophthalmoscopically.) The patient's sight, with some myopic astigmatism corrected, was R $\frac{20}{20}$, L $\frac{20}{30}$. Field of vision full in good daylight, but in dull light, in which the author's own field remained of normal size, it shrank to 10° from the fixation point all round.

Ophthalmoscopic examination did not, as was anticipated from the history, reveal a condition of retinitis pigmentosa. In each eye there were early changes in the papilla, which had a slightly waxy and yellowish appearance; the retinal arteries were a little contracted. At the periphery of the fundus oculi, were numerous small bright dots, discrete and sharply outlined; there were also a few tiny circular dots of pigment, in shape quite unlike the deposits met

* Hdbuch d. Offent. Gesundheitswesen. Bd. ii. 534.

with in retinitis pigmentosa. This was the diagnosis made, however.

In September of the same year, condition practically unchanged. The patient was not seen again till early in 1888 ; his condition in the interval had somewhat altered. Central vision as in 1885, but fields of vision considerably contracted even in good daylight, and in dull light their limits were 5° all round.

Ophthalmoscopically, decided changes were evident. In each eye the papilla had become more waxy and the arteries smaller. There were numerous stellate and spindle-shaped deposits of pigment in the retina, generally following the course of the vessels, and involving chiefly the equatorial region ; scarcely one of the previously described bright dots could now be detected free from pigment.

In the interval between the first and second visits, two younger members of the family began to complain of night blindness ; they were about the age at which the patient began to be affected. Unfortunately they could not be examined.

It is very regrettable that this patient was not under observation continuously from his first visit ; had he been so, the gradual development of the typical pigment deposits might have been seen. The author thinks it likely that these deposits may begin as round dots of pigment, such as were discovered at the first examination of his patient, and that only at a later date in the development of the malady they assume their well-known shape. Although several authors have recorded cases resembling Peltesohn's more or less closely, he had been unable to find a single reported case of night blindness, etc., without pigment in the retina, in which the typical changes of retinitis pigmentosa were subsequently seen to develop. Cases have been described (Poncet) in which though no pigmentation was evident by ophthalmoscopic examination, the microscope revealed much finely divided pigment in the retina ; and others (Nettleship) in which the ordinary symptoms of retinitis pigmentosa existed, with retinal changes, in some respects akin to those described by Peltesohn.

J. B. L.

C. F. PRENTICE (New York), Dioptric formulæ for combined Cylindrical Lenses, Applicable for all angular deviations of their Axes.—*James Prentice and Son, New York.*

IN this little book the author gives the results of his investigations of the properties of bicylindrical lenses. These have in general two focal planes, and act in the same manner as do the ordinary combinations of spherical and cylindrical lenses, so that they may be said to have a sphero-cylindrical equivalent. The sphero-cylindrical equivalent depends upon the focal strength and sign of each cylinder, and upon the angle which their axes make with each other. Only when the axes coincide does the spherical effect altogether disappear, and the resulting lens correspond to that of a cylinder of a focal strength equal to the algebraical sum of the strengths of the two component elements. On the other hand, the cylindrical effect disappears when cylinders of the same strength and sign are combined with their axes at right angles. Such lenses are equivalent to biconvex or biconcave ones.

The author begins by obtaining a formula for the positions of the primary and secondary planes respectively, with reference to the angle between the axes of the two cylinders. He finds that when the two component cylinders are of equal strength and sign, these planes bisect the angles between their axes. When the component cylinders are of unequal refraction the primary plane is nearer to the perpendicular to the axis of the stronger cylinder, and the secondary nearer to that axis itself. Slightly different positions relatively to the axes are occupied by these planes when one cylinder is convex and the other concave. He next proceeds to determine the positions of the primary and secondary focal planes, measured from a plane within the combined cylinders, perpendicular to the optic axis. These values, F_1 and F_2 , he obtains in terms of the focal plane of either cylinder, or the two elementary focal planes f_1 and f_2 ,

and the angle γ separating the planes of greatest refraction of the cylinders. The general formulæ thus obtained are somewhat lengthy, but reduce for the case of equally refracting combined cylinders of the same sign (where, therefore, $f_1 = f_2$) to

$$F_1 = \frac{f}{1 + \cos \gamma}$$

and

$$F_2 = \frac{f}{1 - \cos \gamma}$$

For facilitating the calculation in dioptries he puts for $\frac{1}{F_1}$ and $\frac{1}{F_2}$, R_1 and R_2 , and for $\frac{1}{f_1}$ and $\frac{1}{f_2}$ respectively, r_1 and r_2 . These values then represent the different focal strengths in metre lenses, and the above formulæ become

$$R_1 = r(1 + \cos \gamma)$$

and

$$R_2 = r(1 - \cos \gamma)$$

The spherical effect is then $\frac{1}{F_2}$. The cylindrical $\frac{1}{F_1} - \frac{1}{F_2}$, or

in dioptric lenses respectively, R_2 and $R_1 - R_2$. The following example is given of the simplest case where the combined cylinders are of equal refraction. Given the f_1 and $f_2 = 20$ in. and γ , or the angle separating their most highly refracting planes, $= 60^\circ$, to find the sphero-cylindrical equivalent.

$$F_1 = \frac{20}{1 + \cos 60^\circ} = \frac{20}{1 + 0.5} = 13.33$$

$$F_2 = \frac{20}{1 - \cos 60^\circ} = \frac{20}{1 - 0.5} = 40$$

We then get, putting in their values for F_1 and F_2 ,

$$\frac{1}{F_1} - \frac{1}{F_2} = \frac{1}{20}$$

And consequently the sphero-cylindrical equivalent

$$\frac{1}{40} \text{ sph. } \odot \frac{1}{20} \text{ cyl.}$$

The following table is calculated from the more general formula for the case of combined cylindrical lenses of the

same sign, for which the reader may be referred to the original :—

Elementary Refractions.	Axial Deviat'n.	Primary Refraction.		Secondary Refraction.	
		R_1	<i>Approx.</i>	R_3	(<i>Approx.</i>)
$r_1 > r_2$	γ				
2.5 \oslash 1.5 <i>D.</i>	30°	3.75 <i>D.</i>	3.75 <i>D.</i>	0.25 <i>D.</i>	0.25 <i>D.</i>
" "	45°	3.46	3.5	0.54	0.5
" "	60°	3.09	3.	0.91	1.

Similar formulæ and tables are given for the case of cylinders of opposite signs.

The question comes to be, how far such bicylindrical lenses are of any practical value. They seem to be occasionally ordered in America, but the fact that only a slight difference in the angular separation of the axes of the combined cylinders makes a considerable difference in the nature of the sphero-cylindrical equivalent, and therefore in the effect of the glass, seems to render them somewhat unpractical; the more so as they can effect no more for vision than the corresponding combination of a spherical and cylindrical lens. They may possibly, however, prove to be of advantage in the subjective examination of astigmatism. At all events, some thanks are due to Mr. Prentice for the excellent manner in which he has elucidated a subject which has not hitherto attracted much attention.

G. A. BERRY.

BRITISH MEDICAL ASSOCIATION.

Fifty-sixth Annual Meeting, held at Glasgow, August, 1888.

SECTION OF OPHTHALMOLOGY.

THOMAS REID, M.D., President, in the Chair.

Reported by KARL GROSSMANN, M.D.

(Continued from page 277.)

Thursday, August 9th.

General Neuroses having an Ophthalmic Origin.—Mr. H. B. Hewetson made reference in this paper to the well-known frequent occurrence of headaches due to errors of refraction. He pointed out that astigmatism especially is to be blamed for these neuroses, such as sick headaches, etc., although very often they were due to carious teeth and to irritation of the ear. In many cases, the constant use of cylindrical lenses effected a complete (the only possible) cure. Even insomnia had thus been cured. Several cases were given with full particulars. Mr. Hewetson then drew some diagrams on the blackboard, indicating how and when the localisation of pain was to be considered as due to caries of the teeth.

Mr. Brudenell Carter gave some more details of one of Mr. Hewetson's cases, and also mentioned some of his own where nervous symptoms had been cured by the use of glasses.

Mr. Bickerton remarked that he had lately noticed with Dr. Wigglesworth that epileptic fits had often been brought on by ametropia and cured by glasses.

Mr. Carter said he had cured epileptic fits in some instances by glasses long ago.

Dr. Reid pointed out that those cases generally gave the greatest amount of trouble where the ametropia was of a slight degree only, but large enough to give a great deal of constant work to the ciliary muscle.

Operation of Opening the Sheath of the Optic Nerve for the Relief of Pressure.—Mr. Brudenell Carter, referring to this operation, and to the case published in *Brain*, July, 1887, gave an account of three more instances in which he had incised the sheath of the optic nerve.

The first was a middle-aged man whose sight had been failing. Right eye $V = \frac{20}{50}$, left eye barely perception of light. The sheath of the left optic nerve was opened, and vision seemed to have completely disappeared in that eye a few days afterwards. The right eye subsequently improved to $\frac{20}{40}$.

In the second case a young woman had been seized with severe headaches, vomiting, and loss of sight. Both discs were swollen. Left eye $V =$ fingers close to the eye; right eye $V = O$. The left sheath was opened, and two days afterwards the cerebral symptoms greatly improved. The sight improved gradually but slowly in the left eye, and the right eye regained perception of light. The case had been diagnosed as intra-cranial tumour, and iodide of potash and mercury had been given throughout.

The third case was a woman æt. 70, suddenly attacked by violent headache, with gradual and complete loss of vision within a few days. Both discs were swollen, $V = O$. Here, also, the left sheath was opened, followed by a gradual return of vision in the left eye ($V = \frac{1}{10}$). The swelling of the left disc disappeared, and that of the right disc decreased somewhat.

Although the first case seemed a failure, the others are such that Mr. Carter recommends the operation in every instance of swollen disc with decrease of vision.

Dr. Wolfe remarked that at the International Ophthalmological Congress in 1867, M. de Wecker had described an operation for the incision of the optic sheath in cases of swelling of the disc, but that nothing had been heard of the operation since. Mr. Carter's two last cases certainly seemed to justify the re-introduction of the operation.

Mr. Bickerton said he had lately performed the operation in two cases, one of which seemed to have shown improvement of vision. It was, perhaps, too early to say much as to the return of sight, but the almost instantaneous

relief of the intense headache, giddiness, etc., was evidence to him of the benefit due to the procedure.

Mr. Carter replied that M. de Wecker incised the nerve-sheath without bringing it into view, a proceeding which he considered dangerous.

On the Value of the Cautery in the Treatment of Ulceration of the Cornea.—Dr. J. C. Renton said he had every reason to recommend the cautery for corneal ulcerations. As for the form of the cautery, he considered the simplest that of Mr. Simeon Snell; it is strongly to be recommended as being portable and easily heated. A second very good form was the thermo-cautery. Thirdly, he recommended the electric cautery, especially the one made for himself by Mr. Salt, of Birmingham. This is specially useful in those cases where penetration of the cornea is wished. Lastly, the ball-cautery, which has the advantage of being very simple and portable, and retains the heat long enough for practical requirements.

As for the treatment, antiseptics are used, and preference is given to corrosive sublimate along with cocaine. The cautery is applied lightly, and, where necessary, the corneal layers are penetrated into the anterior chamber. After the cauterisation, dry dressings and atropia are employed and a very nourishing diet given to the patient.

As suitable cases for the cautery, Dr. Renton considers (1) traumatic ulcers at all stages; (2) idiopathic ulcers of all kinds. These may often be benefited, especially when recurring in strumous children and weakly women, rheumatic and gouty subjects, or those suffering from granular ophthalmia; the granulations being also cauterised with great advantage.

The cautery acts by destroying the infective material. In this way the process of ulceration is arrested, the cause is removed, and with some assistance the ulcers heal readily.

Dr. Nelson expressed surprise to learn that the cautery was not generally used for corneal ulcers. At the Cambridge meeting, in 1880, he had read a paper on the same subject

on behalf of Prof. Fuchs, advocating the bulb cautery very strongly, and ever since he had used it with excellent results.

Mr. Snell fully agreed with Dr. Renton in the great benefit derived from the actual cautery. He did not think perforation dangerous, and he now approached cases of hypopyon-keratitis with much greater confidence than before using the cautery.

Mr. C. G. Lee was able to corroborate the good results obtained by others. He had applied the cautery in more than one hundred cases, one of which he mentioned in particular. The whole cornea had been opaque and yellow—an almost desperate case; but three applications of the cautery resulted in restoring enough sight to allow the recognition of large objects.

Dr. Wolfe was against cauterising the cornea, disastrous results having been observed by him.

Dr. Meighan had been greatly satisfied with the cautery in two bad cases of chronic corneal ulcer.

Three Cases of Conical Cornea treated by the Actual Cautery.—Mr. Richard Williams advocated in this paper the treatment of conical cornea by cauterisation. He showed the instrument he used, and said that one application to the apex of the cone immediately reduces the conicity and leaves a deep pit. This heals as an ulcer, and leaves a small, firm scar, rendering further ectasia practically impossible. He spoke against the opening of the anterior chamber and the escape of the aqueous as unnecessary and dangerous. In each of his cases all trace of conicity disappeared, and vision was greatly improved. He strongly recommended this plan of treatment, on the following grounds :—

(1) Its extreme simplicity; (2) its freedom from danger and ease of performance—anterior synechia being impossible, and sloughing of the cornea extremely improbable; (3) its good results, both visually and as regards the arrest of the morbid process.

Friday, August 10th.

On the Treatment of Entropion and Trichiasis by the Transplantation of Buccal Mucous Membrane.—Mr. A. H. Benson read a paper on this subject, in which he described the steps of the operation now performed at St. Mark's Ophthalmic Hospital and the City of Dublin Hospital. He advocated the use of numerous sutures as against Van Millingen's recommendation of none, and also that the clamp should be left on the eyelid till the flap had been sutured in position, as the bleeding that followed its removal did not injure the chances of the flap living.

During the past three years 577 cases of granular ophthalmia had been treated in St. Mark's Hospital. Of these, 210 had entropion or trichiasis, and 128 were operated on by transplantation of buccal mucous membrane. He recommended the operation as suitable for all cases of entropion and trichiasis, where the disease was considerable, and advocated a complete transplantation in all cases.

Mr. Fergus said Snellen's operation, performed by many operators, seemed to have always given satisfactory results. In cases where there was not much incurvation of the lid, and where trichiasis existed along the whole lid, Mr. Benson's operation might be preferable.

Mr. Square referred to the well-known mode of ligaturing the skin in slighter degrees of entropion, by means of a few stitches of silk, which begin to suppurate after a few days, and then leave retracting scars.

Mr. Richard Williams fully approved of the principle advocated by Mr. Benson, of adding material to the already contracted eyelid. Whether it was necessary, however, to introduce a piece of mucous membrane from a strange part or not, was a matter of controversy. He was of opinion that this was not necessary, and that it was sufficient to keep the tarsus in a gaping condition for a prolonged period. This he had done for some years with very good results.

On the Treatment of Symblepharon by Transplantation of Mucous Membrane from the Lip.—Dr. T. S. Meighan said the method of transplanting flaps of conjunctiva from the surrounding parts as adopted by Mr. Teale was certainly a very good one, but it only answered where a superficial destruction had taken place and where the sulcus of the conjunctiva had been left comparatively free. Where, however, the surface to be covered is a very large one, the retraction due to cicatricial shrinkage usually neutralises to a great extent the good result to be expected from an otherwise successful operation. In such cases it is absolutely necessary to transplant additional mucous membrane from some source or other. In Dr. Meighan's hands conjunctiva transplanted from the human eye and from the rabbit did not give satisfactory results. He resorted to the mucosa of the patient's lip with much greater success. After having repaired the original defect as well as possible by the surrounding conjunctiva, he maps out the remaining defect on the inside of the patient's lower lip and dissects the mucous membrane off, care being taken to make an ample allowance for subsequent shrinking. The mucosa is carefully cleaned of the labial glands and of any fat, washed with a 0.2 per cent. solution of corrosive sublimate, and stitched on with a sufficient number of sutures. The eye is bandaged and left undisturbed for at least 24 hours. Dr. Meighan gave a description of four of his own cases in full, three of which were highly satisfactory. In one a secondary shrinking set in, which will necessitate a repetition of the operation.

Mr. Hewetson gave an account of his experience of transplanting, in severe cases of symblepharon, the conjunctiva taken from a healthy rabbit. The results obtained in Leeds were highly satisfactory. Care ought to be taken to use plenty of stitches; the flap may look suspicious for a few days, but it gradually changes to a pink colour and becomes organised.

Hyalitis Punctata.—Mr. A. H. Benson read the notes of a case of "Hyalitis punctata," a term by which he proposed to designate a condition observed on, or in the neighbourhood of, the anterior portion of the hyaloid membrane,

exactly similar in appearance to that observed so commonly on the posterior surface of the cornea in cases of serous iritis.

It occurred in an unmarried woman aged 32, in fairly good general health and free from syphilitic or other constitutional taint. The eye presented the ordinary appearances of keratitis punctata with but very slight iritis, and in the position of the posterior capsule of the lens were a number of punctiform spots, exactly similar in arrangement and appearance to those on the cornea. These could only be seen when a strong lens (+ 26 D) was used in the ophthalmoscope—when the corneal spots were visible, these were not, and *vice versa*.

They extended over a very considerable area and seemed all to lie on a plane at right angles to the corneal axis. They did not extend to any depth into the vitreous, but were lying on, or very close to, the posterior capsule. The anterior surface of the lens and its capsule were also free. These spots are not to be mistaken for the "dust-like" opacities seen in specific disease. The deeper portions of the vitreous had various forms of opacities, but no punctiform ones. There was also evidence of old choroiditis.—Mr. Benson had only once before seen a somewhat similar case, where a few such spots were visible on the posterior lens capsule.

Chronic Nasal Catarrh as a Reflex Cause of Accommodative Asthenopia.—Dr. P. W. Maxwell said his attention was drawn to the fact that very often patients who came for advice for their eyes were also suffering from the ears at the same time. In these cases the eye symptoms were almost invariably accommodative asthenopia, or else inflammation of conjunctiva or lids. The ear complaint had its origin usually in the naso-pharynx. The asthenopia often disappeared during the use of glasses, but recurred when the glasses were put aside again, whereas very often the glasses could be left off altogether after a complete cure of the nasal catarrh. Glasses were frequently of no use whatever to the patient who was told to go on wearing them; the treatment of the catarrh alone restored the patient to health. He thought that in all cases where the patient was breathing

through the mouth instead of the nose, the latter ought to be examined very carefully, and would probably be found to be the cause of all mischief. He could confirm himself that, when he closed his nostrils, reading began to be most tiring after about half an hour. He thought the asthenopia due to a reflex action, and hereby explained the success obtained repeatedly. The history of four cases was given in full as illustrating the above.

Argyria of the Conjunctiva.—Dr. Grossmann demonstrated several microscopic specimens of two cases of argyria. One of these was described in the June Number (p. 167) of the *Ophthalmic Review*.

Cavernous Sarcoma of the Choroid.—Dr. Grossmann also exhibited microscopical sections of the case described in the August Number (p. 229) of the *Ophthalmic Review*.

Symblepharon Cured by Transplanted Conjunctiva from the Rabbit.—Dr. Wolfe showed a successful case to the Section.

AMERICAN OPHTHALMOLOGICAL SOCIETY.

TWENTY-FOURTH ANNUAL MEETING.

Held at New London, Conn., July 18th and 19th, 1888.

President: DR. WILLIAM F. NORRIS, OF PHILADELPHIA.

Reported by DR. EDWARD JACKSON.

(Continued from page 284).

Œdema of the Choroid and Retina, Transient Astigmatism.—Dr. E. Jackson reported the case of a young man whose eye-ball had been bruised by a flying missile. There was œdema of the choroid in spots arranged like a rupture of that membrane. These spots disappeared in a few days. There was also localized œdema of the retina, which disappeared in two days. Water-colour sketches of the ophthalmoscopic appearances were shown. There was also a myopic

astigmatism which, starting at 0.75D, three days after the injury, steadily diminished, until it disappeared entirely in three weeks.

Symptomatic Myopia.—Dr. W. F. Mittendorf thought it deserved more attention than it had received. It might arise from rupture of the zonule of Zinn by traumatism, through swelling of the lens; in the same way in commencing cataract; or through exudation into and swelling of the vitreous body in glaucoma, serous choroiditis, or iritis. Cases were reported where it had occurred in connection with each of these affections. These illustrated that myopia may be brought about by certain diseases, it being only a symptom, and disappearing with the subsidence of the disease causing it.

Dr. J. O. Tansley had seen myopia in a case of localized exudative choroiditis, which disappeared wholly as the choroiditis got well.

Dr. B. A. Randall had seen, in beginning cataract, an eye become (6 D) more myopic, without any notable loss in the transparency of the lens.

Dr. C. Koller had seen such myopia in iritis, but explained it in another way. He thought it was due to an irritation of the ciliary muscle, that it was a spastic accommodation.

Dr. S. D. Risley: In a few instances myopia has seemed due to a dread of light. He had noticed that in some cases it seemed confined to the vertical meridian.

Dr. Mittendorf had supposed that the free use of a mydriatic would prevent apparent myopia due to accommodation, and, therefore, he had supposed it due to the swelling of the vitreous.

Dr. Risley: In irritable or inflamed eyes we have great difficulty in securing the full effect of a mydriatic.

Dr. J. Green (St. Louis) had first noticed the myopia as the inflammatory symptoms were passing away, and it continued to decrease for some time after all inflammation had passed away. Having looked for it for twenty years, he could say that myopia in connection with iritis was not uncommon.

Hysterical Blindness in the Male.—Dr. W. O. Moore (New York) reported three cases. The first was the case of

a married man, aged 22, who had enjoyed good health, except that for the last two years he had presented some symptoms of nervous trouble. He claimed that with the left eye he had no perception of light. The appearance of the eye was normal; and a prism, held with its base up before the good eye, gave vertical diplopia, proving binocular vision. He was promised a speedy cure by electricity. The faradic current was applied, and its strength suddenly increased so as to cause a considerable shock. After the first application he could see somewhat, after a second his vision equalled 20/50, and after the third it was found to be 20/20.

The second patient was 22, unmarried, free from sexual vices, but with a family history of insanity. Eighteen months before he had used atropia, and had become greatly excited over the resulting mydriasis. He used dark glasses, then shades over his eyes, and then, in addition, confined himself to a dark room. He was pale and sickly from long confinement. Ophthalmoscopic examination was impossible until he had been etherized. The appearances were then found to be normal. Under ether he gave evidence of seeing. A free canthoplasty was then done on each eye; and on recovering he was told that the cause of his blindness had been discovered and removed. On the second day he walked about without guidance, and went rapidly on to complete recovery.

Case 3, a boy of 15, who had been disappointed with regard to obtaining a prize in school, began complaining of his eyes, and was brought with alleged blindness of the right eye. Appearance normal; diplopia with prisms. He was etherized, and the good eye covered with a bandage, and on recovering gave convincing evidence of good vision in the right eye, and was cured. Dr. Moore believed it was a mistake to tell patients of this class that there was nothing the matter with them, and so dismiss them.

Dr. E. Jackson had seen a weakly, nervous coloured boy, of 14, who claimed to have bare perception of light. Having placed his eyes under atropia, he was given a confident prognosis of improvement as the effects of the drug wore off; and he was soon found to have vision equal 20/20.

Dr. S. D. Risley had seen hysterical aphonia replaced

by photophobia, soon after being thrown in contact with a person whose eyes were under the influence of a mydriatic.

Tests for the Detection of Sub-normal Colour Perception.—

Dr. C. A. Oliver (Philadelphia) had devised the tests for use in railway service. It is a well-known fact, both from theoretical and practical standpoints, that many "colour-blinds," especially those of medium grades, have the power of differentiation by day-light, of the most difficult colours, when placed at one metre, the ordinary distance for wool selection, in the determination of colour-blindness. In the hope of overcoming the dangers that might arise from this power in situations, such as railways, marine and naval service, where the safety of lives and the protection of property is oftentimes solely dependent upon recognition of colour at great distances, and frequently through the intervention of more or less translucent media, the writer had been induced to combine two modifications of his method of colour selection to a simplified plan of the former procedure by which the candidate is placed in the actual position of work and under exactly similar circumstances as during employment. The method is divided into three parts:—First: the selection and registry of a definite number of loose wools from 23 pure and confusion match-skeins, thrown upon a dead black surface at one metre distance. Second: the selection and registry of the same number of similar reflected colours under various intensities of diffuse daylight stimulus, placed at distances requisite for safety. Third: the selection and registry of transmitted colours, under various intensities of artificial light stimulus, placed at distances requisite for safety. The method has the following advantages in addition to those shown to refer to the first test alone. First: Much faster in time than any other method. Second: The selection of loose wools at a distance. Third: No necessity for an expert except in doubtful cases. Fourth: Employment of the same character of signal for testing as is used in daily routine. Fifth: Placing the eye at a distance necessary for future safety. Sixth: Bringing the eye during testing directly before the true condition of weather experienced whilst it is upon duty. Seventh: Test and match colours all graduated in proportionate sizes.

Embolism of the Central Retinal Artery.—Dr. C. A. Oliver reported a case of this kind seen soon after its occurrence, when there was some light perception, but in which sight was soon entirely lost.

Dr. W. P. Mittendorf had in two cases, in which the upper branch only was obstructed, seen considerable subsequent improvement in vision. It was remarkable how quickly the characteristic appearances of this affection were developed. He had seen them within five hours of the occurrence of the symptoms.

Dr. S. M. Burnett had recently seen two cases in old people. In one the blindness was absolute, in the other there was some power of vision in the lower outer portion of the visual field.

Irideremia, and Upward Coloboma of the Iris.—Dr. S. Theobald reported the case of a boy eighteen months old, with convergent strabismus of the left eye, and complete absence of the iris in both, with clear lenses. His mother presented a congenital coloboma of the iris in each eye: in the right directly upward, in the left upward and outward. She stated that another of her children had eyes like the one she brought.

Dr. D. Webster (New York) thought the direction of the coloboma was very unusual. He did not remember to have seen a case in which it had that direction.

Dr. B. A. Randall: There are several cases on record of so-called coloboma extending inward or outward, but none in which the deficiency extended upward. This case was unique.

Detachment of the Retina Cured by Puncture.—Dr. T. Y. Sutphen (Newark) reported the case of a man aged 62, a book-keeper, myopic 16. The detachment commenced in the upper inner portion of the retina of the right eye. It gradually increased, and the left eye became affected. Rest in bed, potassium iodide, profuse diaphoresis, and avoidance of work failed to bring about improvement. At the end of six months vision was limited to the lower outer portion of the field for the left eye. Puncture of the retina was now done through the sclerotic: first on the right eye, with the escape of considerable fluid; then on the left, no fluid escap-

ing. Puncture was made under antiseptic precaution, and there was no reaction. He was strictly confined to bed for 28 days. The retina was now apparently normal, and the field of vision complete for each eye. Two months later the detachment recurred in the left, and vision was reduced in that eye to counting fingers ; upward and inward puncture was practised a second time, and again the retina returned to its normal position. Two days later the field of vision was again normal, and for each eye $V = 15/100$, and with $-1.24 = 15/50$. Within another month, however, the detachment in the left again took place, and, in spite of another puncture, is now almost complete. In the right the improvement has been maintained, now over seven months ; he is using it moderately. Vision, as before the detachment, with correcting glass $= 15/20$.

Dr. D. Webster had seen this case, and congratulated Dr. Sutphen on its truly remarkable cure. He had no experience with the operation, nor had it been practised by the late Dr. Agnew, who had been deterred by witnessing the loss of an eye by it in the practice of another.

Dr. E. Jackson believed that such an untoward result could now be prevented with certainty, by the use of aseptic methods. He had recently tried the operation in a case of 18 months' standing, where other methods of treatment had failed. There had been no serious reaction from the operation, but it had failed to secure the replacement of the retina or any other good result. The patient had not, however, been subsequently confined to bed.

Dr. E. E. Holt (Portland) had seen complete replacement of detached retina under the jaborandi treatment, and the cures had lasted for years. He had seen no improvement from puncture.

Dr. J. F. Noyes (Detroit) had withdrawn the subretinal fluid with a hypodermic syringe, with improvement to vision. The eye was subsequently enucleated for a melanotic growth which the replacement of the retina revealed.

Dr. S. D. Risley had seen, after the slow resorption of the fluid under treatment, a sudden return after jumping from a street car in motion. He believed that the entire quiet of the patient was an important part of the treatment.

Glioma of the Retina.—Dr. F. P. Capron (Providence) exhibited photographs of a case in which he had recently enucleated the contents of the orbit. The orbit was healing nicely, but there was evidence of glandular involvement. The first symptoms had been noticed a year before.

Dr. J. F. Noyes had, in a child 4 years old, and then totally blind, diagnosticated glioma while the tumour was yet in both eyes confined to the back part of the globe. The parents refused to permit enucleation, and the child died within a year, the growth having filled the orbits and perforated into the temporal fossæ.

Dr. S. B. St. John (Hartford): A child presenting the appearances of glioma in the fundus had a month before a febrile attack, said to be "malaria." A brother had about the same time cerebro-spinal meningitis. There was no increase in the tension of the globe. What was the importance of increased tension in the diagnosis of glioma?

Dr. D. Webster had never seen increased tension in glioma until the second stage was reached.

Dr. S. F. McFarland (Binghampton) had enucleated an eye for glioma some years ago, and the diagnosis had been confirmed by microscopical examination. The child was still in good health.

Dr. S. D. Risley: Considering the entire safety of puncture of the sclerotic, as illustrated by the cases reported by Drs. Bull and Sutphen, would it not be proper, in a case of suspected glioma, to introduce a hypodermic needle into the mass and attempt to obtain a specimen for microscopical examination?

The President believed it would be justifiable.

Dr. W. F. Mittendorf could recall having seen but two cases of glioma. It seemed to be more common in other localities. Would it not be well to have all cases reported, with especial reference to distribution and heredity?

Extraction of a Partially Calcareous Lens.—Dr. D. Webster reported the case of a woman aged 23. The left eye had been lost by a blow, and was enucleated. The right presented the calcareous remains of a lens, with iritic adhesions. It had undergone needling operations. V= counting fingers at two feet. After an iridectomy, the division of

iritic adhesions, and an unsuccessful attempt at extraction, extraction was accomplished, and the correcting glass gave $V=20/20$.

Models, Card Specimens, etc.—Dr. S. M. Burnett exhibited a set of models made of wood and wire, illustrating refraction by lenses. These had been worked out, with general formulæ applicable to all kinds of lenses, by Mr. Prentice, of New York.

Dr. B. A. Randall showed sketches of the fundus in cases of sarcoma of the choroid, anomalous outgrowths on the optic disc, and anomalies of the retinal veins.

At the suggestion of Dr. E. Jackson, a committee was appointed to consider the subject of numbering prisms according to their refractive power.

The Society adjourned, to meet in Washington, September 19th of the present year.

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A STATISTICAL REVIEW OF 1,626 CASES OF CATARACT EXTRACTION.

BY SURGEON-MAJOR E. F. DRAKE-BROCKMAN, F.R.C.S.

SUPERINTENDENT GOVERNMENT OPHTHALMIC HOSPITAL, MADRAS.

In the OPHTHALMIC REVIEW for August, 1884, I had the pleasure of submitting to the readers of that publication a statistical review of 1,767 cases of cataract extraction which had passed under my care during the preceding fifteen years. I now venture to record a second series of 1,626 cases of cataract, on which I have operated during the period between January 10th, 1885, and August 4th, 1888. I have kept notes of these cases as accurately as was possible in the midst of a busy professional career. In analysing these statistics, I have followed the same plan which I adopted in my first paper. It will be found, however, when comparing this with my former record, that I have added a few more tables, in order to elucidate some points more distinctly, in connection with the various methods of operation. My work has necessarily been chiefly among the natives of this country, of various castes and creeds, and in consequence, obvious difficulties have presented themselves in my endeavours to obtain reliable information on several points. The natives are, as a rule, very unobservant, and are therefore not in a position to give much information in matters in which they are most closely concerned. The testing of the visual powers after operation continues still to be a matter of difficulty, and I have invariably been obliged to use the test dots of Snellen's *Optotypi* for this purpose. Even this simple test fails in some instances, owing to the crass ignorance of the patients. These have been classified under the

terms "*good vision*" and "*fair vision*," in proportion as they were able to define and describe objects of interest in ordinary life at convenient distances. This testing has always been made on the day of their discharge from hospital.

During the past period of three years and seven months, the number of cataract cases which have applied at the hospital has greatly increased. The accommodation in my hospital is limited to forty beds for natives of all castes, and sixteen for European and Eurasian patients. I have therefore been obliged to discharge cases from hospital at the earliest possible period after an operation, in order to admit those who may perhaps have travelled some hundreds of miles on foot for the purpose of undergoing treatment. The average length of stay in hospital has therefore been from about eight to ten days after the removal of a cataract. Some patients left hospital within forty-eight hours of the operation, at their own risk. The acuteness of vision on trial has therefore been, in such cases, inferior to those in which a longer period was permitted to elapse before the sight was tested. Certain allowances must therefore be made when comparing the results of the operations now reported with those obtained by other operators.

Writing this review at a distance from any books to which I can refer, I am unable to offer any observations on this subject. Those who may find leisure to read this somewhat dry rehearsal of my work in this branch of surgery will be better able to compare these results with their own. In this country diseases of the eye are very prevalent, arising from causes attributable to the climate and to the environment of the patients, as well as to national idiosyncrasies. Of all ocular diseases occurring among natives, demanding surgical interference, cataract stands foremost: For instance, during the year 1887 I performed 1,200 major operations on the eye in the Ophthalmic Hospital, of which 477 were for the removal of cataracts. The following table exhibits

the number of such operations which have been performed by me during the period under review :—

TABLE I.

Year.	Primary capsule rupture.	Mooren's	Teale's	Pagenstecher's.	Linear.	Total.
1885	292	32	13	0	0	337
1886	333	19	16	4	0	372
1887	410	39	17	5	6	477
1888	398	15	13	6	8	440
Total	1433*	105	59	15	14	1626

This table shows a steady yearly increase in the number of cataracts which have been submitted to operation. Regarding the methods of operation, I shall make some observation towards the end of this paper.

The kinds of cataract met with.—The subjoined table shows the number of each kind of cataract. In my former paper I separated the "black" cataracts from the other forms, but in this paper I have included them under the heading "Hard senile," as all of them occurred in adults between the ages of fifty and seventy. I have also separated the "Cortical" cataracts, occurring in persons between the ages of twenty and thirty-five, from the congenital forms of the disease, and I have included the "Diabetic" cataracts among the "Mixed or Cortico-nuclear."

TABLE II.

Cortico-nuclear (including 12 diabetic cataracts)	...	939
Hard Senile (including 16 black cataracts)	...	377
Morgagnian	...	209
Congenital	...	53
Cortical	...	24
Traumatic	...	21
Lamellar	...	3
Total...	1,626	

* 263 with iridectomy ; 1,165 without.

From this table it may be observed that the mixed cataract has been the most frequent form of the disease among all classes of both Europeans and natives, and following this the "Hard senile" cataract. The "Morgagnian" cataract is also of frequent occurrence, and has the "mixed" form as its immediate antecedent. The nature of the food of the Hindoo influences in a very marked manner the formation of the "mixed" and "diabetic" cataracts. The Mahommedan community furnished the larger number of the "hard" cataracts. In sixteen of the latter the cataracts presented deep shades of colouring, in some cases approaching complete blackness. Microscopic examination of sections of the blackest of these failed to show any incorporation of degenerated blood constituents.

Congenital cataracts.—No less than fifty-three of these came under treatment. Some of these patients had reached adult life. As a result, cretaceous changes had taken place in the lens capsule and the lens; and, in some instances, the lens structure had undergone almost complete absorption, leaving behind merely the capsule in a condition of degeneration. These were treated in the same manner as the more recent cases, viz.: by Teale's suction method. All of these proved successful. I have not experienced any difficulty in dealing with these cases by this method, and the dangers reported by others I have never met with. If the various steps of the operation are conducted with due care. I consider this operation, for this class of cases, the most suitable and successful. It will be noticed in one of the appended tables that the operation of keratonyxis has not been resorted to, for two principal reasons: first, that the needling operation must necessarily extend over a considerable period of time; and, secondly, that the natives of this country resent too frequently repeated operations however mild such may be in their character. Teale's operation removes a deformity, and restores sight in a very brief

space of time, both of which considerations weigh materially with the native.

Morgagnian cataracts.—No less than 209 came under treatment in persons of very advanced age. A considerable number of these suffered from glaucomatous changes in the eye. It is of course difficult to be certain of the relations, if any, which exist between this form of cataract and the glaucomatous symptoms which show themselves in its progress. I cannot but believe that the increased distension of the lens capsule by the softened fluid material of the cataract causes undue pressure on the ciliary processes, and becomes an efficient agent in hindering the passage of the lymph stream through the anterior lymph channels. I have frequently met with a patient with cataract in both eyes, one being of the hard or mixed variety, and the other a Morgagnian cataract, the latter followed by, or complicated with, glaucomatous changes of a more or less acute nature, which demanded immediate surgical interference. I have therefore advised patients who present themselves with mixed cataract not to delay in submitting to an operation for its removal, because of the attendant dangers resulting from increased intra-ocular tension.

Lamellar cataracts.—Three such cases presented themselves in young persons. In these cases I thought it advisable to deal with them as with complete congenital cataracts, viz.: by Teale's suction method. I have followed this course because the native does not understand or appreciate the benefits derivable from the performance of an iridectomy, if the central lenticular opacity is left untouched. It is not easy to convince a native by reasons which would influence European parents. Unless conviction can be effected by demonstration, the native is slow to believe mere statements, however well-founded.

Traumatic cataracts.—These occurred, in all instances, in persons below thirty years of age, and chiefly in males,

and resulted from accidents occurring while at work. These were also treated by removal of the opaque softened lens matter by the suction method, as soon as signs of irritation showed themselves. If the operation is undertaken in time, before inflammation of the contiguous structures has been set up, the results are always favourable.

Vision after operation.—Of the total number treated, viz., 1,626, vision was restored in 1,535 cases, and from various causes vision was lost in ninety-one cases, or in the proportion of 6 per cent of failures (accurately 5·59 per cent.). This is, I think, a very favourable result when it is taken into consideration that no selection was made in the cases which underwent operation. If we analyse this result yet more closely under the heads of the various operations, the following figures are obtained :—

TABLE III.

Primary capsule rupture	...	...	failures	80 or 5·59%
Mooren's operation...	...	...	„	9 or 8·57%
Teale's operation	...	...	„	1 or 1·69%
Linear operation	...	...	„	1 or 7·14%

The principal causes of failure after operation were :—

TABLE IV.

Suppurative keratitis	...	47 or 51·66%	of total no. of failures.
Iritis	...	27 or 29·67%	„
Irido-Choroiditis	...	4 or 4·39%	„
Suppuration of Eyeball	13 or 14·38%		„

Arranging these figures once more under the various operations the following results are obtained :—

TABLE V.

	Prim. Capsule Rupture	Mooren.	Teale's.	Linear.	Total.
Suppurative Keratitis	45	2	0	0	47
Iritis	26	0	1	0	27
Irido-Choroiditis ...	3	0	0	1	4
Suppuration of Eyeball	6	7	0	0	13
Total	80	9	1	1	91

From these latter tables it will be observed that suppurative keratitis and iritis were of most frequent occurrence in primary capsule rupture, and panophthalmitis after Mooren's operation.

Again, of the total numbers of operations, 883 were performed on the right eye, and 743 on the left eye. Of these numbers there were males 902, and females 724. It may also be mentioned that in 249 of the above total both eyes were operated on, so that the total of the operations does not correspond with the number of persons treated. From these facts it may be seen that both sexes suffered from cataract almost in equal proportion. Blindness in the native female is not regarded as of much importance among native men. This is due to the fact that native men treat their females as inferior to themselves in social position. As time passes on, and education becomes more advanced among the natives of this country, the status of the female will be raised, and I have no doubt they will be permitted to benefit as much by western ophthalmic science as men, and will be allowed to seek advice at our hospitals as frequently.

Classes of Patients.—I have grouped the patients under 4 classes, viz., Hindoos, Mahommedans, Eurasians, and Europeans, in the following proportions:—

TABLE VI.

Hindoos ...	...	1,314 or 80.80%
Mahommedans ...	...	211 or 12.36%
Eurasians...	...	70 or 4.36%
Europeans ...	...	31 or 1.90%
Total ...	...	1,626

Ages of Patients.—In the accompanying tables I have arranged the cases under decades from birth to 90 years of age, the youngest being 3 months, and the oldest 90 years of age. The first of the subjoined tables shows the ages of all males and all females separately. The second exhibits the ages under the different classes.

TABLE VII.

	Birth to 10 yrs.	11 to 20.	21 to 30.	31 to 40.	41 to 50.	51 to 60.	61 to 70.	71 to 80.	81 to 90.	Total.
Males.	18	17	39	67	243	350	133	34	1	902
Females.	13	14	19	98	233	280	59	8	0	724
	31	31	58	165	476	630	192	42	1	1,626

TABLE VIII.

	Hindoos.	Mahom- medans.	Eura- sians.	Euro- peans.	Total.
Birth to 10 yrs...	23	4	2	2	31
11 to 20 ...	27	2	1	1	31
21 to 30...	52	2	3	1	58
31 to 40...	148	8	5	4	165
41 to 50...	404	58	12	2	476
51 to 60...	520	89	18	3	630
61 to 70...	128	30	19	15	192
71 to 80...	20	9	11	2	42
81 to 90...	0	0	0	1	1
Total...	1,322	202	71	31	1,626

From the above tables it may be noticed that the

largest number of cataracts occurred between the ages of 51 and 60 years both among males and females, and from those ages a decrease in both directions occurs. The next greatest number occurred between the ages of 41 and 50, so that it may be safely concluded that the periods of life between 40 and 60 years may be expected to furnish the largest number of cataracts in both sexes.

In the latter of the two preceding tables, in which the classes of the community are represented, a difference is strikingly marked out between the natives of this country and those of pure or of partially European descent. For instance, among the former (Hindoos and Mahommedans) the largest number are met with between the ages of 40 and 60, whereas among the latter (Eurasians and Europeans) the period of life between 50 and 70 years furnished the largest number. These figures closely correspond with the results I reported in my former paper, in which I stated that "the greater portion of the cases of cataract occurred between the ages of 50 and 60 years, in the proportion of 38·03%, and between the ages of 60 and 80 years in the proportion of 30·67%." In a letter from Dr. G. A. Maconachie, of the Cowasji Jehanghier Eye Hospital in Bombay, dated 12th August, 1884, to the editor of the *Times of India*, I find it stated "that the largest number of cataracts in males occur from 51 to 60, and in females from 41 to 50 years. He compares these figures with some Parisian statistics drawn up by De Wecker, which show that the majority of cases in males, and almost all those in females, occur between 60 and 70; and the conclusion at which he arrives from the comparison is that "senility evidently occurs about 10 years in the Indian male, and in the Indian female about 20 years earlier than in the European."

Vision after operation.—The following table will demonstrate the degree of vision which was restored to patients who had undergone an operation. As I have already mentioned, the testing of the visual powers

was made on the day of discharge of the patient from hospital, that is, on an average of from eight to ten days after an operation, and the test dots of Snellen's types were used. The results taken so soon after an operation are not so satisfactory as when a longer time has been permitted to elapse. The immediate return of patients to their homes, and the probability of never seeing them again, necessitated the early testing of their vision.

TABLE IX.

	6m.	5m.	4m.	3m.	2m.	1m.	Good.	Fair.	Total.
Primary Capsule Rupture (iridectomy).....	12	0	57	115	28	1	32	14	259
Primary Capsule Rupture (no iridectomy).....	94	25	284	371	131	18	123	48	1094
Teale's operation.....	1	0	10	5	2	1	30	7	58
Mooren's operation.....	1	0	5	16	16	2	24	32	96
Pagenstecher's	1	0	1	5	4	0	2	2	15
Linear	0	0	2	5	1	0	5	0	13
Total	109	25	359	517	182	22	216	103	1535

Of the total successful results nearly one-third had vision of $\frac{1}{2}$ restored to them; *i.e.*, they were able to decipher and count the test dots at 3 metres. The next largest number included those who were able to read the test dots at 4 metres. Then follows those who read at 2 metres, and those who read at 6, 5, and 1 metre respectively. The two columns at the end of the table include those who regained their sight, but were too ignorant even to count the test dots, and from whom no definite replies could be extracted. Their vision was tested therefore by obtaining from them a defined description of objects of interest at various distances, and in this way judging of their visual powers comparatively and approximately.

This table is of interest in showing under which method of operation the best results were obtained. The operation to which, in my former paper, I have given the name of "Primary Capsule Rupture" has furnished the best results. Of the 109 who read at 6

metres, no less than 106 had been so operated on. In some of these cases I was obliged to remove a portion of the iris after completing the corneal section, the chief reasons for such proceeding being the bulky nature of the lens, or the non-dilatation of the pupil caused by posterior synechia. I am always reluctant to excise a portion of the iris as a step in the operation for removal of a cataract, and I never do so, unless there are direct indications pointing to its necessity. It will be observed, in reference to this point, that in those cases in which no mutilation of the iris occurred the best results were obtained. This statement is also strengthened, I think, by the results obtained after Teale's operation. It may be urged, perhaps, that the forcible passage of a hard cataract through the limited area of the pupil must cause as much damage to the iris, with the risk of inducing subsequent iritis, as the removal of a segment of that structure. I cannot say that such has been my experience, provided the pupil has been fully dilated a few days beforehand. Even at the risk of inducing a subsequent attack of iritis by the passage of the lens through the pupil, I would prefer leaving the iris intact, rather than by iridectomising vitiate the subsequent visual result of the operation. The removal of a portion of the iris constitutes one of the steps of Mooren's operation, and in the 105 operations by the latter method, eighty-one cases developed glaucomatous symptoms, after the maturation of the cataract, and on this account an iridectomy was performed. In seventeen cases it was done on account of old adhesions of the iris to the capsule of the lens; and in seven cases on account of the generally enfeebled condition of the patient, which forbade too severe an operation being undertaken at one sitting. Among those cases in which glaucomatous symptoms developed, I find fifty-one were morgagnian cataracts, and thirty were hard bulky senile cataracts. I have already referred to this subject in the former part of this paper.

Anæsthetics.—In the year 1884, cocaine was introduced to the notice of ophthalmic surgeons, and I have since that date used it very extensively. I have used solutions ranging in strength from 1 to 4 per cent. It has been my practice to instil a few drops of the solution thrice within the palpebral fissure at intervals of five minutes, before proceeding with the operation of extraction. After trials of the various solutions, I find that a 2 per cent. saturated boracic acid solution is quite effectual, and sufficiently active for all operations on the conjunctiva, cornea, and iris. Such solution I have used in 814 cases. Prepared in a saturated boracic acid fluid, I have found that the drug retains its active powers for an almost indefinite period of time, without the generation of fungus in the fluid. In only 162 cases was chloroform administered, when patients showed signs of nervousness, and when difficulties or accidents in the performance of the operation were anticipated.

There is, I think, a decided advantage gained in not employing chloroform as an anæsthetic, viz., in the avoidance of prolapse of the iris in those cases in which the iris is left entire. The following table records the number of occasions in which a prolapse of the iris occurred with an escape of some of the vitreous. The vectis was used on some occasions to facilitate the removal of the lens, and the escape of the vitreous in most cases may be probably attributed to the introduction of this instrument within the eye.

TABLE X.

	Prim. cap. rup.	Teale's.	Pagenstecher.	Total.
Prolapse of Iris ...	99	0	0	99
Escape of vitreous....	60	3	1	64

In my former paper I find that out of 1,042 cases in

which chloroform was administered, prolapse of the iris took place 119 times, or in the proportion of 11·42 per cent.; whereas, in the 1,626 cases now recorded (in which are included 162 cases when chloroform was administered) a prolapse of that structure happened in but 90 cases, or in the proportion of 5·53 per cent. This shows a marked contrast in favour of the use of cocaine over chloroform.

Peculiarities in some cases.—In ten cases *elephantiasis* of the lower extremities associated with an extreme degree of anæmia was present. All these cases did well, recovering without an untoward symptom. It is somewhat remarkable that, in the native, an extreme degree of anæmia does not appear to militate in the progress of an operation for removal of cataract, and on this account I have never hesitated to operate. In one case *leprosy* was present in a mild form, and gave no trouble either at the time of operation or subsequently. Three patients presented extensive *valvular disease and degeneration of the coats of the vessels*. The operation in one of these failed by suppuration (necrosis) of the cornea; the other two made good recoveries. In five cases *albuminuria* was present. Before undertaking the operation, all were placed under a preparatory treatment consisting of a regulated dietary, and, medicinally, ergot, digitalis, and iron, with fuchsine, in one grain doses three times a day. The urine was tested periodically, and as soon as the quantity of albumen had markedly diminished, the operation was performed. Irido-choroiditis in an acute form terminated one of these cases unfavourably. Five cases suffered from diseases of the nervous system; one from *paraplegia* of old standing, one from *chorea*, and three were *lunatics*, who were sent for treatment by the superintendent of the Government Lunatic Asylum. All these ended favourably. One lunatic (a woman) who was excessively mischievous on admission, as soon as sight was restored, became a changed character. All her mischievous propensities vanished and she tried to make herself useful in the ward.

A second, a Mahommedan by caste, who, before the operation was always regarded as an inoffensive individual, suddenly, on the day following the operation, developed a violent and homicidal tendency towards the other inmates of the ward, and had to be returned to the Asylum within forty-eight hours after he had been operated upon. The greatest difficulty was experienced in retaining the dressings on his eyes, and the patient positively declined to be hampered in this manner. It was therefore thought better to remove all dressing, and the case terminated very well. I saw him afterwards at the Asylum, and found that the operation had been very successful. In all these cases I administered chloroform in order to secure quietness during the operation.

Eight cases were complicated with well-developed *pterygium*, which was avoided in making the corneal incision. This is an unfortunate condition, as the diseased state of the conjunctiva has a tendency to become aggravated by the confinement of the eye by bandages, and this leads to a prolonged and tedious recovery. The vision also was modified by the irregularity of the corneal surface.

In five cases, *lacrymal obstruction* was present, with accumulation of the secretions in the sac, and the production of a chronic conjunctivitis. Before attempting the removal of the cataract, the obstruction was overcome by a division of the canaliculus and passage of graduated probes, with the application of antiseptic collyria to the surface of the conjunctiva. As soon as the obstruction was removed, and a more normal condition of the conjunctival surface established, the extraction of the cataract was effected with success in all cases.

In two cases *Retinitis Pigmentosa* was present. The vision in both these cases was considerably improved by the removal of the opaque lenses.

In two cases *Coloboma Iridis* was co-existent, and advantage was taken of this to make the corneal

incision in a downward direction. The results were good.

One extraction was performed in a woman in the eighth month of *pregnancy*. The pregnant state did not appear to interfere with the favourable progress of the case.

In ninety cases the lens capsule was removed after the lens had been extracted. I think it is always advantageous to remove the capsule, if it can be done without much damage to contiguous structures.

Secondary operations after extraction.—These comprise the performance of an iridectomy on account of glaucomatous symptoms; excision of portions of the iris prolapsed through the corneal section; division by the needle of opaque membranes the result of iritic inflammation, and of the posterior capsule of the lens which had undergone fatty or calcareous changes; and iridotomy for the purpose of enlarging the pupillary area. These secondary operations were 118 in number, as may be seen from the following table.

TABLE XI.

	Division Opaque Membrane.	Iridotomy.	Excision Prolapsed Iris.	Iridectomy for Glaucoma.	Total.
Primary Capsule Rupture with Iridectomy	9	0	0	0	9
Primary Capsule Rupture without Iridectomy ..	55	8	33	5	101
Mooren's Operation	3	1	0	0	4
Teale's Operation	3	0	0	1	4
Total	70	9	33	6	118

From this table it may be observed that the largest number of secondary operations of all kinds were required in those cases in which the iris was left intact. The non-removal of a segment of this structure would

therefore appear to be a disadvantage in any method for the removal of a cataract. The results as recorded in Table IX. show that, although doubtless the favourable termination of cases may be delayed by such complications, the ultimate issue is not necessarily discouraging, for the visual results, mentioned in the table last referred to, are, to say the least, good.

Operations.—There has not been much variety in the operations performed by me during the past forty-three months. In all, five methods have been employed, viz., Teale's suction operation, Pagenstecher's, Linear Extraction, Mooren's, and that which I have already designated by the name of primary capsule rupture.

Teale's suction operation was performed in 59 cases, of which one failed from an acute iritis. All cases of congenital cataract of whatever kind, and those caused by accidents, were thus treated. I am aware that some authorities have represented Teale's operation as one associated with danger. I cannot share in this opinion, for in all my cases no secondary conditions arose to excite any alarm with reference to the final result. Each step of the operation demands extreme delicacy of manipulation in order to insure a successful issue. I have during the period under review altogether discarded the operation of keratonyxis, as being too long-drawn out to suit the majority of native patients. The brilliancy of the results obtained by Teale's operation goes a great way in securing the confidence of the native of this country in western ophthalmic surgery.

Pagenstecher's operation was performed fifteen times. In all these cases the cataracts were of very old standing, and bore indications of the loose connection of the lens capsule with the zonule of Zinn. As soon, therefore, as the corneal section was completed, the lens in its capsule was carefully expressed from its position, or helped out by means of a spoon or scoop. No instance of failure is recorded.

The *Linear operation* was employed in fourteen cases of

cortical cataract, of which one proved unsuccessful from an acute attack of irido-choroiditis, followed by softening of the eyeball.

Mooren's operation was performed 105 times, attended with nine failures, a proportion of 8·57 per cent: This result contrasts most favourably with my own experience as recorded in 1884. This operation was adopted under the following circumstances:—

In eighty-one cases glaucomatous symptoms were present. Of this number fifty-one were Morgagnian cataracts, and thirty hard senile cataracts.

In seventeen cases posterior synechiæ were present, the result usually of syphilitic iritis.

In seven cases the patients were extremely debilitated, and the extraction of the cataract was therefore divided into two steps.

In some of the cases in which glaucomatous symptoms demanded surgical interference, severe hæmorrhage followed, and the subsequent removal of the lens was proportionately delayed. Except for these reasons, I think a delay of a longer period than from seven to fourteen days between the iridectomy and removal of the cataract is unnecessary.

Primary capsule rupture.—I have already in my former paper given my reasons for naming this operation, and have described the method of operating. I have performed this operation in all 2,107 times, 674 cases of which have been recorded in my former paper; the remainder, viz., 1,433, have been performed during the past forty-three months. Of the latter number, the operation failed eighty times, or in the proportion of 5·58 per cent. This shows a very great improvement on my last return, in which the percentage of unsuccessful events was 11·72. If the total number, viz., 2,107, be taken, it will be found that the proportion of failures is 7·54 per cent. These results contrast favourably with any other method of operation. I have employed this operation in all forms of senile cataract,

and in some cases of cortical cataracts, and I have every reason to be satisfied with the results. I have abandoned the crucial incision of the anterior capsule, and have adopted, instead, a linear division of that structure along the upper margin of its circumference. This is a more simple procedure, and is equally effectual.

Dressings.—In the treatment of these cases I have used a variety of dressings. The principal have been dry applications of absorbent cotton wool with a pad and bandage. I reported favourably on this dressing in my former paper. I have also used isinglass plaster without pad and bandage, but this I was obliged to abandon, after a brief trial, for three principal reasons. First, in this country, where the skin acts so freely, the plaster loosens its hold, and cannot act so well as in a temperate climate ; secondly, on account of the above circumstances, it fails to afford a due amount of support to the corneal section, and permits of the prolapse of the iris through the section ; thirdly, it is often a temptation to the patient to interfere with the applications, and disarrange the dressing.

It has lately been proposed to remove all dressings from the eyes, after the expiration of the first twenty-four hours, and to expose the eye to light. I have acted on this advice on several occasions, but my experience of the plan has been that severe inflammation of the iris and deeper structures has followed, with loss of vision. Without due support to the divided cornea a ready tendency to gaping of the corneal section is very likely to take place, with prolapse of the iris where the structure has been left entire. It should not be adopted indiscriminately in all cases of operation. On the other hand, I am sure that in some instances, this plan of after-treatment answers well, viz., in those whose conjunctivæ resent the confinement by bandages, and take on a catarrhal action. Also in those cases in which there has been a history of a more or less

chronic ophthalmia, or where the lacrymal apparatus has been inflamed, and obstructions have existed to the removal of the lacrymal secretions by the canaliculi.

The plan I have most frequently used, and which I continue to follow, is that advocated by Mr. Berry, in the *OPHTHALMIC REVIEW* of September, 1885. This I am satisfied with, being based, as I think, on sound principles.

ENTOPTIC PERCEPTION OF THE RETINAL VESSELS.

By KARL GROSSMANN, M.D.

About two months ago, when awakening one morning after a long sound sleep I turned on to my right side, lifting my left arm over my head, so that my left eye was completely covered. The window of my room being to my left, my right eye was well shaded in this more comfortable than elegant posture. When I happened to open the right eye, I saw before me very plainly, on the white sheet, a figure, consisting of two almost parallel black lines, slightly curved, and enclosing an oval grained spot. Fig. 1 represents its shape as nearly as possible, but the oval patch has come out far too dark and heavy in the woodcut. This figure disappeared almost instantly, while I kept my eye open. I did not take any notice of it, and closed my eye again; but on reopening it, after a little while, I saw exactly the same figure as before, perhaps more distinctly. My attention was now roused, and I tried to find out to what the phenomenon was due. The figure disappeared about half a second after opening the eye, but on closing the lids for a short time, and then reopening, it again appeared, though less distinctly; and, after a few repeated trials, it ceased to be visible. I now tried the left eye in the same way, but with negative results.

My first idea was that this phenomenon was produced by the entoptic perception of a few horizontal folds in the corneal epithelium (parallel to the edges of the lids.*)" It was, however, improbable that such a figure should disappear so quickly after opening the eye, and that it should recur after closure of the lids, without any pressure by the finger. I had almost forgotten the occurrence, when, some mornings afterwards, I noticed exactly the same thing under similar circumstances. This time figures appeared to both eyes. The right eye perceived some small branches, like twigs, on

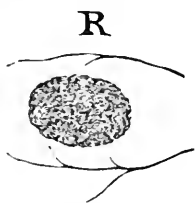


FIG. 1.

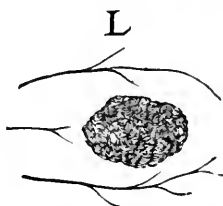


FIG. 2.

the two lines. The figure seen by the left eye is represented by Fig. 2; a third bifurcating line was evident between the two larger lines common to both eyes. I noticed that in all the lines the branching occurred towards the granular area.

More I could not perceive, the whole apparition being so fleeting that it could be reproduced only about half a dozen times.

Being now thoroughly interested, I made a point of watching for the apparition next morning, but after sleeping badly, I was unable to perceive any such figures. On the following day, however, I was more successful. Great was my surprise when, after awakening and becoming conscious of my intended experiment, I suddenly opened my right eye (having first covered the left) and, staring at the ceiling, I saw as clearly as possible a figure represented in Fig. 3, appearing black

* *Vide* Helmholtz. *Physiol. Optik*, Fig. 73, p. 151.

on the white ground. The granular oval spot in the centre was very dimly seen, but recognisable, and the two horizontal lines of Fig. 1 were in their place, forming part of the picture. This did not last more than half a second, and could be reproduced by closing the eye for a short time, and then reopening. The left eye, when tried, perceived an image represented by Fig 4. It will be seen at a glance that Fig. 2 forms the centre of Fig. 4.

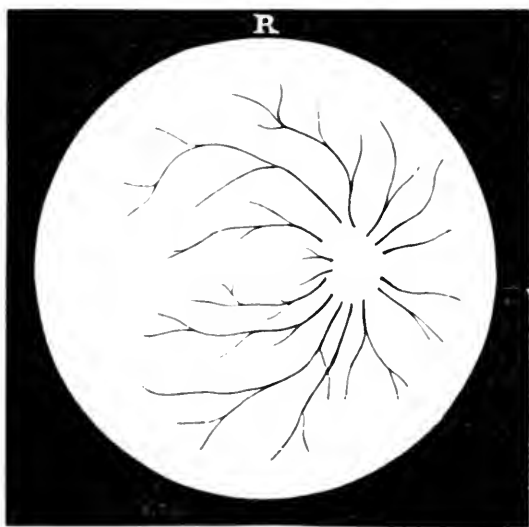


FIG. 3.

There was no doubt as to the explanation of these figures. It was evident from their configuration that they formed a spectrum of the retinal blood-vessels. In order to be sure of this, however, I examined the image of the vessels, brought into view by Müller's, Purkinje's, and other methods. It was rather difficult to identify the figures in this way, since the use of candle light shows much finer ramifications of the vessels, and complicates the picture considerably. I found the nearest approach to the figures described

was obtained by auto-ophthalmoscopy, by which the principal branches only become visible.

The granular appearance of the oval area in the centre, which corresponds to the *macula lutea*, I have not always been able to perceive. Sometimes it was very distinct ; sometimes invisible. Occasionally it had a more hexagonal arrangement, reminding one of the honeycombed figure which Dr. Arthur Kœnig gives in "Græfe's Archiv," Vol. XXX., p. 329, and plate III. Fig. 3.

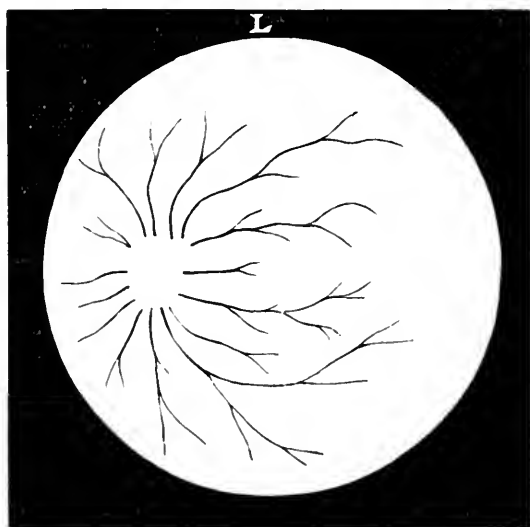


FIG. 4.

The position of the optic disc was evident by the complete absence of perception ; the lines broke off at its edge, leaving a circular gap.

I have been particularly careful to eliminate any possibility of deceiving myself about the phenomena here described. During the two months or so that I have noticed them, I have so often observed them that any uncertainty about them may be discarded ; nor can here be a second opinion regarding their nature.

Everything points to an entoptic perception of the retinal blood-vessels. The position of the yellow spot and optic disc, as well as the lines themselves, indicate this. The only point surprising to me is that the shadows of the retinal blood-vessels should be perceived without the help either of any particular arrangement for the source of light, or the means of moving this light about.

Still, there is no theoretical reason why the spectrum of the vessels should not be perceived, if every condition is favourable for it. In my case, the night's rest sufficiently accounts for the increase of sensibility experienced at the first opening of the eyes in the morning. Perhaps age has something to do with this. I remember very well what great difficulties I had in obtaining good after-images twelve years ago, when in the physiological laboratory at Utrecht; now a few seconds are sufficient to produce after-images, while then fifty to sixty seconds' exposure was necessary. Possibly the assimilation of the retina decreases at as early a period as the power of accommodation; but on this point we have not yet sufficient knowledge.

I may mention that I have not been able to reproduce the above phenomena in the daytime by closing my eyes. Perhaps I have not kept them dark for a sufficiently long time. No doubt my observations will be corroborated by some, while others will fail to do so. These differences may be due not only to the individual, but also to the age of the observer. I am, for instance, unable to properly perceive the so-called Maxwell's spot in blue light, either as described by Helmholtz (*Physiol. Optik.*, p. 420), or by Mayerhausen (*Gräfe's Archives*, Vol. XXVIII., 2, p. 283).

MAUTHNER (Vienna).—On the Differential Diagnosis of Paralysis of the Elevators and Depressors of the Eyeball.—*Wien. Med. Wochenschrift*, 1888, Nos. 24, 25.

This paper forms part of Mauthner's work, now in the press, "On Ocular Paralysis." He commences by the statement that the different effect of the elevators and depressors of the eyeball, according as the eyeball is ab- or adducted, is of much importance, and will alone enable a diagnosis to be made. The lagging of the globe in the vertical action of the paralysed elevators or depressors will, he points out, be least perceptible in that position of the eye in which these muscles have least effect on the vertical movement. Both the superior and the inferior recti have least effect on vertical movement when the globe is adducted, while the oblique muscles have their maximum effect on vertical movement in this position of the globe. Suppose now that the right superior rectus is paretic. On looking directly upward, the image belonging to the right eye will appear somewhat higher than that belonging to the left. So in the case of a paresis of the right inferior rectus the corresponding image will appear somewhat lower. If now in both cases the eyes be moved to the left and upward (left and downward), in both cases the distance between the double images will diminish, because in both cases the elevation (depression) of the globe takes place from a position (namely that of adduction of the right eye) in which the superior and inferior recti have least effect on vertical movement. On the other hand, in paresis of these recti, the distance between the double images will increase when the eyes are moved to the right and upward (right and downward), for in these positions the paralysed muscles have their least effect on vertical movement. That is to say, when, on looking upward, the image of the right eye stands higher than that of the left, there is weakness of the elevating power of the right eye. If, on looking upward and to the right, the vertical distance between the images increases, and on looking upward and to the left the distance

diminishes, then there is paresis of the right superior rectus, no matter what the lateral relation or the obliquity of the images. The same applies *mutatis mutandis* to the right inferior rectus.

It being remembered that the oblique muscles have their greatest vertical effect when the globe is abducted, the vertical distance of the double images will have a similar meaning in the diagnosis of paralysis of the oblique muscles. On the difference in vertical distance of the double images, when the globes are moved diagonally, will depend the diagnosis between paralysis of the rectus superior and obliquus inferior on the one hand and the rectus inferior and obliquus superior on the other. The relation of distance will manifestly be precisely opposite for the recti and the obliqui, seeing that the vertical action of the first is at minimum in that position of the globe where the other is at maximum, viz., adduction, and *vice versâ* for abduction.

We have been taught, Mauthner says, that in paralysis of the superior and inferior recti the images are crossed, while in paralysis of the obliqui they are homonymous. So also we are taught that in paralysis of the superior rectus and of the inferior oblique the upper ends of the images diverge, while in paralysis of the inferior rectus and superior oblique the upper ends of the images converge. It seems, therefore, that the convergence or divergence of the images will give a means of diagnosis between paralysis of the recti and the obliqui. For example, the patient looks directly upward, and the image of the right eye stands higher and to the right, *i.e.*, it is homonymous; the images diverge at their upper extremities—a paresis of the right inferior oblique. But in another case there is the same condition, only the images converge—paresis of the right superior rectus in which, from some complication, the crossed images have been altered into homonymous. Again, on looking directly downward, the image of the right eye stands lower, is crossed, and leans to that of the left eye at its upper extremity—paresis of the right inferior rectus. In another case the same conditions, except that the images diverge—a paresis of the right superior oblique in which again the homonymous images have been changed by some complication into crossed ones. This, Mauthner says, goes

very well on paper, but in practice it fails. For one thing, the patients very frequently notice spontaneously no obliquity whatever in the images. For example, a case of right superior oblique paralysis may, on looking downward, note that the image of the right eye stands to the right, and lower than the other ; also that it is nearer, but not that it is oblique. Mauthner has even found such patients allow on its being suggested to them that the images diverge above. He points out that the obliquity is least where the vertical distance is greatest, and the absence of parallelism is then difficult of detection ; it is greatest where the vertical distance of the image is least, and here the absence of parallelism is readily detected. He considers that the obliquity of the images will rarely give help in diagnosis, while on the other hand the variation of the vertical distance of the double images above described will invariably do so.

He then proceeds to inquire how it comes that the images in a case of oblique paralysis may be crossed, and those in a case of superior or inferior rectus paralysis may be homonymous. He takes an example. In the upper part of the field a patient has no diplopia, whether directly above, to the right or to the left, which means that both the elevators and the lateralisers of the eyes act normally. On looking downward, however, he has diplopia, the image of the right eye being to the left and lower. This corresponds with a paresis of the right inferior rectus. But, on investigation, it appears that, looking to the right and downward causes the distance between the images to decrease, while looking to the left and downward causes the distance to increase. According to what has been said, this cannot be the result of a paresis of the inferior rectus, but must, notwithstanding the crossing of the images, be due to a paralysis of the superior oblique. How come the images to be crossed ? Mauthner believes it to be due to insufficiency of the internal recti. This insufficiency shows itself when an eye is blind, by divergence of the eyes owing to overaction of the external recti. Ordinarily, however, the internal recti by contraction are able to secure single vision ; but when from any cause there is double vision, which the internal recti cannot overcome, they give way, and the

globes diverge. In a case of superior oblique paralysis, with insufficiency of the internal recti, therefore, there may be single vision in the upper half of the field and double vision with crossed images in the lower half of the field, owing to the divergence produced by the giving way of the weak internal recti. And, as in the case of paralysis of the obliqui, the images may be crossed owing to insufficiency of the internal recti; so, although of less frequent occurrence, in paralysis of the superior or inferior rectus, there may be homonymous images from insufficiency of the external recti. Of this Mauthner gives an example, a case of nuclear paralysis.

For the differential diagnosis of the paralyses of the four recti and the four obliqui concerned in elevating and depressing the globes, he gives the following rules:—If there is diplopia in the upper half of the field, single vision in the lower, an elevator is paretic. Which? Find the place of greatest vertical distance between the double images. Then—

If greatest distance to left and above:

1. Image of left eye higher.
Rect. sup. sinist.
2. Image of right eye higher.
Obliq. inf. dexter.

If greatest distance to right and above:

1. Image of right eye higher.
Rect. sup. dexter.
2. Image of left eye higher.
Obliq. inf. sinist.

If there is diplopia in the lower half of the field, single vision in the upper, a depressor is paretic. Which? Find the place of greatest vertical distance between the double images. Then—

If greatest distance to left and below:

1. Image of left eye lower.
Rect. inf. sinist.
2. Image of right eye lower.
Obliq. sup. dexter.

If greatest distance to right and below:

1. Image of right eye lower.
Rect. inf. dexter.
2. Image of left eye lower.
Obliq. sup. sinist.

J. A.

PURTSCHER (Klagenfurt). The employment of Creolin in the treatment of Eye Diseases.—*Centralbl. f. prakt. Augenheilk.*, March, 1888.

MERGL (Pressburg). On the use of Creolin, Iodoform, and Antipyrin in the treatment of Eye Diseases.—*Centralbl. f. prakt. Augenheilk.*, Aug.—Sept., 1888.

Purtscher gives a brief account of his experience with creolin, of which medicament he has formed a high opinion, and which he thinks is a valuable addition to the ophthalmic surgeon's pharmacopœia. He uses a freshly-prepared 1° solution, finding that a solution when a day old changes colour, though he is doubtful if this is accompanied by any alteration in its therapeutic powers. The application of this 1° solution to the conjunctiva of a healthy eye is followed by rather severe smarting pain and spasmodic closure of the lids. This gradually passes off in three to four minutes, and some ciliary injection remains. The use of cocain, before applying the creolin, entirely prevents this discomfort, and does not seem in any way to interfere with the effect of the latter drug.

In *conjunctivitis simplex*, especially those cases with considerable catarrh, and those accompanied by changes at the corneal limbus (marginal conjunctivitis), and in *conjunctivitis phlyctenulosa*, with much photophobia and blepharospasm, the results of treatment by creolin were very satisfactory.

In the papillary form of trachoma, in recent cases, the effect of creolin was extremely good. The author had never seen such rapid improvement under any other form of treatment. Even in old cases with scarring of conjunctiva and pannus much good was effected.

He also recommends the use of creolin in blenorrhœa of the lacrimal passages. Injection of the solution into the lacrimal sac in a case of mucocœle was very effective, and an extraction of cataract was successfully performed shortly afterwards.

Lastly, in all forms of keratitis with ulceration,

Purtscher obtained very good results ; and he is especially laudatory of the treatment of hypopyon-keratitis by this means.

Mergl was led to try creolin by perusal of the foregoing article, and gives a more detailed account of the results he obtained. Although he considers it a valuable agent in the treatment of several eye affections, he speaks, generally, less enthusiastically of it than does the previous writer. We say generally, because in one class of cases, viz., trachoma, he commends the drug very highly. His experience here corresponds with Purtscher's, in that recent cases gave brilliant results, while older cases were less amenable to the treatment ; and though he advises the use of creolin in such cases to begin with, he states that recourse must often be had to strong astringents in order to completely get rid of the granulations.

Iodoform in a 10% vaseline ointment has, in Mergl's hands, proved a very valuable means of treating ulceration of the cornea, especially where hypopyon co-exists. The ointment is applied to the cornea, and smeared on the external surface of the lids, and the eye tied up with pad and bandage. Atropine or eserine were also used in some of his cases. At the Clinique, to which the author is attached, fifty patients with hypopyon-keratitis have been treated in this way during the last two years, and in only two instances has paracentesis been resorted to. He thinks that, in addition to the healing properties of this ointment, it markedly relieves the pain, which in these cases is often severe.

Of antipyrin, Mergl has not had much experience, but he records three cases in which he has used it in the hope of dispersing corneal opacities, and is of opinion that it may prove of considerable value. Cocain in solution is first used, antipyrin in powder is then dusted into the eye, and, after a few minutes, friction is applied through the upper lid. This process of massage is repeated daily.

J. B. L.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

THURSDAY, OCTOBER 18TH, 1888.

HENRY POWER, F.R.C.S., in the Chair.

Reported by JOHN ABERCROMBIE, M.D.

Stereoscopy by Difference of Colours, for the Normal and the Colour-blind Eye.—Dr. Grossmann said that, when a boy, he had often noticed how markedly in some stained glass windows the red parts seemed to stand out from the surrounding surface. When a student he learned that this phenomenon was due to the difference of accommodation; the red rays, being less refrangible, required a greater accommodative effort than the blue rays, in order to be united on the retina. The eye, therefore, made the conclusion that the red was nearer than the blue. Lately Dr. Einthoven had investigated this matter, and found the real reason to consist in the eccentricity of the eye, and the symmetrical arrangement in the fellow eye, whereby the red rays were united on a more temporal part of the retina than the blue rays. Also the position of the pupil was of such great influence, that shifting it artificially, for example, by partly covering its outer or inner half, would be sufficient to reverse the impression. Dr. Einthoven considered the phenomenon a purely stereoscopic one, with very little accessory help on the part of the accommodation; according to him it disappeared completely when one eye was closed. Recently, Dr. Grossmann's attention was drawn to this point again, and he had come to a somewhat different result. In his own case the phenomenon is attributable principally (if not solely) to accommodation. He arranged the two colours in a simple way, so that they formed a perspective drawing, and the stereoscopic effect was thereby greatly facilitated. When this figure was shown to some colour-blind (red-green-blind) individuals, they also perceived the red nearer than the blue, both for binocular and monocular vision. This showed that with them, also, the act was principally one of accommodation. Dr. Grossmann

now made figures with compound colours, using a bluish red and a green. In this figure the red appeared nearer than the green to the normal eye, while the reverse took place for the red-green-blind. Hereby another proof was given that the red-green-blind eye perceived the blue only in the bluish red, while the green was perceived as yellow, corroborating Hering's theory of four fundamental colours, and contradicting the theory of the three fundamental colours, red, green, and violet.

Mr. Power had often observed that in a pattern with lighter and darker colours, the lighter after a time stood out more plainly, and this he was convinced was due simply to light and darkness, and not to difference of colour.

Mr. Brailey thought that to those present the squares gave results exactly opposite to the theories of Dr. Grossmann.

Mr. Doyme could see at will either colour, red or green, more prominent. Most eyes had some error of refraction, and it might be that such slight error of refraction in the opposite meridian would produce the difference.

In reply, Dr. Grossmann said that if Dr. Einthoven's explanation was the only one, with exclusion of accommodation, it was certain that the stereoscopic effect would only hold for one meridian, ordinarily for the vertical lines. If the pupil was not quite centric, it would ordinarily be situated towards the nose. Just as we could not clearly see stereoscopically, horizontal parallel lines, but could easily distinguish vertical ones, this would be the case for lines of different colours. However, when Dr. Grossmann placed parallel coloured lines on a disc, and turned them round, the stereoscopic effect remained, though it was less evident.

Partial Hyperostosis of the Frontal Bone.—Mr. A. Q. Silcock showed a case of partial hyperostosis of the frontal bone. The patient, aged 20, was first seen at the Moorfields Hospital in May, 1883. She then presented a swelling over the left eyebrow, round in outline, with smooth surface, hard and bony to the touch. The left eyeball was displaced forwards, downwards, and outwards. The swelling had existed for two years, and was said to be increasing in

size ; there was a history of a blow on the eyebrow. Iodide of potassium was given for some weeks without effect, and she was lost sight of till May, 1888, when the swelling had become considerably larger. On May 10th, much of the frontal bone was removed with trephine and gouge-forceps, but it was found impossible to extirpate the growth ; since then, no recurrence had taken place. He had shown the case on June 14th, and described it then as an ossifying sarcoma of the frontal bone ; he brought it forward again because he desired to correct an error in diagnosis, as he now considered it a simple hyperostosis. Microscopically there was seen a richly cellular and ill-developed connective-tissue growth undergoing ossification. A description of two somewhat similar cases would be found in Virchow's work on tumours. Hyperostoses presented greater uniformity than did exostoses, and they did not show themselves in the form of a tumour, properly so called.

Living and Card Specimens.—Mr. Silcock : (1) Connective Tissue Tumour in each Orbit ; (2) Sarcoma of both Orbits.—Dr. Tempest Anderson : Instruments : (1) Simple Eye Speculum ; (2) Method of applying Ointments to the Eye ; (3) a Bench for Operating on the Eyes of Children.—Mr. Gunn : Double Proptosis.—Dr. W. J. Collins : Melanosis of Conjunctiva.

A TAPE-MEASURE FOR STRABISMUS.

By PRIESTLEY SMITH.

OPHTHALMIC SURGEON TO THE QUEEN'S HOSPITAL, BIRMINGHAM.

In dealing with concomitant strabismus an accurate measurement of the deviation is certainly a thing to be desired. Records of such measurements and of the exact amount of the improvement effected by treatment are unquestionably useful. Yet, unless I am mistaken, there are many surgeons who, like myself, have usually been content to estimate the deviation by simple inspection, rather than by measurement, for the reason that no very satisfactory means of measurement was at hand. A description of the several methods now employed may be found in Swanzy's Handbook, (second edition, p. 402). The angular method which measures the deviation upon the arc of the perimeter with the help of the corneal reflex is the most accurate, but it is troublesome to carry out, and in the case of children sometimes hardly possible. The method which I here suggest acts on the same principle, but by simpler means. I do not know that it is new; indeed, I can hardly suppose that a proceeding so simple has not been employed by others, but I have not seen it described or in use. The position of the patient's deviating eye is estimated by the position, centric or eccentric, of the corneal reflex of a flame. An ophthalmoscope held either before or below the observer's eye is the immediate source of the light. The perimeter is replaced by a double tape, the use of which is explained by the accompanying figures.

Fig. 1.—The ring O is placed by the observer on his forefinger, or on the handle of his ophthalmoscope.

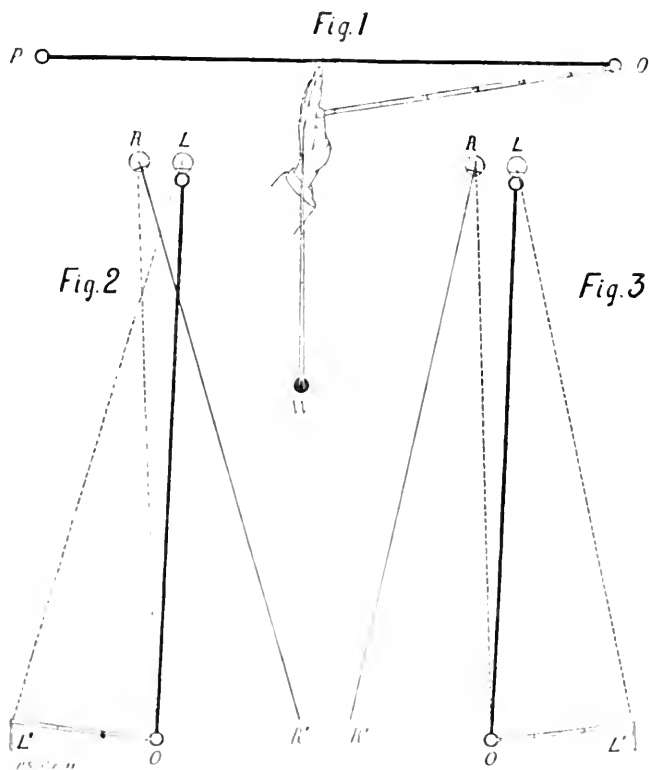
To it are attached two tapes, each one metre in length, one black, the other coloured. The black tape ends in a ring P, which the patient places on his forefinger and holds against his cheek below either eye, or against his chin; it determines the distance between observer and patient, and has no other purpose. The coloured tape is divided by lines into twelve parts, and figured 5, 10, 15, and so on up to 60; it ends in a small weight which keeps it stretched when the hand of the observer passes along it in either direction, the tape sliding between the fingers.

Fig. 2 illustrates the measurement of a convergent strabismus of the right eye. The patient seated below the ophthalmoscope-lamp, and, holding the tape as above described, is told to look at the mirror. The observer, holding the ring O and the mirror in the right hand, throws the light on the left eye, L. He sees the corneal reflex in the centre of the pupil, and knows thereby that this eye is fixing properly. He then throws the light on the right eye, R, and sees the reflex situated eccentrically outwards, and knows that this eye deviates inwards. Taking the graduated tape between the fingers of his left hand, and telling the patient to watch this hand, he moves it outwards along the tape (*see Fig. 1*), and meanwhile watches the corneal reflex in the right eye. When the reflex reaches the middle of the pupil, he reads the position of the hand upon the tape. The axis of the deviating eye, R, has moved from R' to O, through the angle R' R O. The axis of the non-deviating eye, L, has moved through an equal angle O L L'. The angular movement of L, as measured by the tape, equals the angular deviation of R.

Fig. 3 illustrates the measurement of a divergent strabismus of the right eye. In this case the observer sees the reflex of the deviating eye, R, situated eccentrically inwards. Taking the mirror and ring O in his left hand, he takes the graduated tape in his right, tells the patient to look at the hand, and moves it outwards

along the tape until the reflex of R lies in the centre of the pupil. Then, as before, the position of the hand upon the tape indicates the angular deviation.

The hand should in all cases be held edgewise towards the patient; in this position, and at the



distance of one metre, it forms a sufficiently small fixation object.

If the observer desire to take into account the angle α (the angle between the visual axis and the optical axis of the cornea), he notes to what extent the corneal reflex of the non-deviating eye is eccentric when the latter fixes the mirror, and subsequently brings the

reflex of the deviating eye into the corresponding position.

This method has the disadvantage, if it be one, of requiring the patient to fix an object at a distance of one metre instead of across the room, under which condition the angle of the deviation may in some cases be modified by the accommodative act. I do not think this will be found to be a practical disadvantage.

It is obvious also that since the position of the measuring tape does not exactly correspond with the arc of a circle round the non-deviating eye, the angular measurements will not be absolutely precise; but if the observer remember to keep both his hands as nearly as may be at the same distance from the patient's face, no important error will arise. At the distance of one metre, as provided for by the black tape, the measuring tape, being also one metre in length, will subtend an angle of sixty degrees. The largest angle which the length of the observer's arm will allow him to measure with ease is about forty-five degrees.

Messrs. Pickard and Curry have made some tape measures of the kind described.

HAMMERLE (Strassburg). A Case of Temporary Loss of Sight from the Internal Use of Tincture of Opium.—*Deutsche Med. Wochenschr.* October 11th, 1888.

The patient was a small pale man, æt. 30, a painter by trade, who had had frequent attacks of lead colic. Hammerle was called to see him in consequence of obstinate constipation, which had persisted for several days. Severe colic had come on a few hours previously. When seen, he was groaning with pain, paler than usual, pulse regular but feeble. No doubt was entertained as to the nature of the case. Hammerle prescribed Tinct. Opii Simpl. grm. 15 ; of this fifteen drops were to be given every two hours, till three or four doses had been taken.* In addition, repeated enemata and hydropathic bandages to the abdomen were ordered.

As the patient was restless and constantly groaned during the night, his wife continued to give him the medicine without much regard to time or dose, until the entire quantity had been taken. Thus, within twelve hours he took 1·5 grm. of opium. Next morning, when seen by Hammerle, he was greatly stupefied, although not in complete narcosis ; his usually pale face bluish-red, pupils contracted to the size of a pin's head, and almost inactive to light. Some vomiting had occurred during the night, and was followed by a burning pain in the epigastrium.

During the morning sight had gradually but quickly failed, till, at H.'s visit, the patient was completely blind ; he could not see nor point to a lighted lamp held close before him in the darkened room. Pulse small but tense, 120 per minute ; lungs and heart normal.

* The strength of the Tinct. Opii Simpl. of the German Pharmacopœia is one in ten by weight.

Ol. Ricini and Ol. Crotonis were prescribed ; the enemata and bandages to be continued. During the day there was general improvement but no return of sight, and the pupils remained contracted. On the second and third day the pupils were still very small, but sight gradually returned ; and on the fourth day the patient could see as well as ever, and complained only of exhaustion. Nine days later he resumed work.

After giving the history of the case, Hammerle asks how the temporary blindness is to be accounted for. He refers to Nettleship's cases of quinine amblyopia (Trans. Ophthal. Soc., vol. VII.), and thinks the suggestion made by the author, that the loss of sight was due to arterial cramp, will apply equally well to his case. It is known that opium, and especially its alkaloid morphine, when given in small doses, acts as an irritant on all parts of the nervous system which control the circulation, and, as a consequence, contraction of small blood-vessels, increase of blood pressure, and greater frequency of pulse ensue. Hammerle thinks that under certain circumstances large doses of opium may have a similar but more powerful effect, and regular arterial cramp may be the result. It is remarkable, he adds, that this condition should persist in the retinal arteries after relaxation had occurred in other vascular areas, evidenced by the cessation of constipation and the recovery of full consciousness. The previous pallor and poverty of blood may have been an additional factor in this case. The venous congestion of the face resulting from diminished *vis a tergo*, noticed the morning after the administration of the opium, and the rapid small pulse, are also in favour of a condition of arterial cramp having been induced by the poison.

J. B. L.

GORDON NORRIE (Copenhagen). Unilateral Nystagmus. Oscillation of the Pupils (Hippus).—*Centralbl. f. prakt. Augenheilk.*, Aug.—Sept., 1888, page 229.

Unilateral nystagmus appears to be very rare, if we may judge by the records of such cases to be found in ophthalmic literature, the number being not more than seventeen or eighteen. The author adds two new cases to the list.

(1) An infant, aged nine months, came under treatment for inflammation of the right eyelids. The right eye presented no nystagmus. There was no squint. The child's general condition was good. The left eye was nystagmic, the movements quite horizontal, of considerable extent, and very rapid,—about 200 oscillations in a minute. They occasionally ceased for a few moments, and appeared to do so especially when the eye looked strongly outwards, but accurate determination of this point was impossible. The head turned almost incessantly from the median position towards the right with slight inclination towards the same side, the movement occurring about twenty times in a minute. The nystagmus was noticed by the parents at or soon after birth. For the purpose of ophthalmoscopic examination, atropine was used to the left eye; the wide dilation which followed lasted nearly fourteen days, and as it disappeared, the nystagmus began to disappear also. Re-examined some months later, there was no trace either of the nystagmus or of the head movements.

(2) A man, aged forty-three, who had suffered for twenty years from well-marked disseminated sclerosis, and had undergone much hospital treatment, was brought under the notice of the author on account of a recently observed unilateral nystagmus of the left eye. Both discs were chalk-white, V was reduced to finger-counting at 20 and 6 feet in R. and L. respectively. The left eye was in constant movement, the movements being quite horizontal when the

patient looked downwards, but rotatory when he looked above the horizontal line. About 120 to-and-fro movements occurred in a minute. There was no paralysis of the ocular muscles and no squint. Viewed with the nystagmic eye, objects appeared to be in constant movement. The other eye showed no nystagmus except a very slight oscillation immediately before the exact fixation of an object; also when the patient was tired by prolonged examination, a slight rotatory movement, not visible on ordinary inspection, was visible with the ophthalmoscope.

The author draws attention to the association of the nystagmus with movements of the head. This has been noted in other cases. The head movements were here much slower than the eye movements and could not be regarded, as some authors have suggested, as a compensation for the latter, but rather as a result of a cerebral disturbance common to both. The author relates another instance of the same association. Another peculiarity was the change in the character of the movements when the eyes were turned in certain directions. This also has been noted in other cases. The entire disappearance of the nystagmus in the first case is also of interest; the author doubts whether it can be connected with the use of atropine.

P. S.

SWANZY (Dublin). *A Handbook of Diseases of the Eye.—Second Edition.* H. K. Lewis, London, 1888.

We are glad to welcome a second edition of this handbook, which we have read with much pleasure. Considerable advances have been made in ophthalmology since the first edition appeared in 1884, and the author has been careful to make use of this increased knowledge for the benefit of his readers. As he says in his preface, much of the book has been re-written; all the new matter incorporated has added to the value of a previously valuable book.

It is difficult to select any portion for special commendation, but we venture to think the chapters on the motions of the pupil in health and disease, on the diseases of the retina, the diseases of the optic nerve, and the motions of the eyeballs and their derangements are especially well written. The last-mentioned chapter deals with one of the most difficult subjects in ophthalmology, and although it is, perchance, too lengthy for the average student, it cannot fail to be of much value to practitioners, and those who can bring to the perusal of it a somewhat wider knowledge than most students possess.

We doubt the advisability of introducing such changes in spelling as *Dacryo-cystitis* and *Dacryo-adenitis*, though such may be etymologically correct ; for the use of *cilice*, however, we see no justification.

The book is well illustrated ; the diagrams and figures explanatory of the text have been judiciously chosen. An unusually full and careful index completes the volume, within the 442 pages of which a vast amount of information has been compressed. Altogether this is a book we can cordially recommend.

C. H'GGENS (London). *A Manual of Ophthalmic Practice.*--H. K. Lewis, London, 1888.

This manual of 308 pp. forms one of Lewis's practical series, and strictly conforms to its title, in being throughout very practical.

The book consists of two parts, the first, which occupies two-thirds of the total number of pages, including the chapters on optical outlines, the methods of examination, refraction, and diseases and injuries of the eye. The second part is devoted to operations, but, in addition, contains the description of some diseases, such as cataract, which are remediable only by operative measures.

With so limited a space at his disposal, the author de-

serves commendation for the lucid and very concise style in which he has, in general, written. The necessity for brevity, perhaps, has led him, at times, to make too dogmatic statements on some points about which there is still considerable doubt. As an instance, we may quote the following sentence :—" The three internal muscles (of the eye) are the sphincter of the pupil, the dilator of the pupil and ciliary muscle." Want of space may also be urged as a reason for the very scanty treatment accorded to some important subjects ; *inter alia*, Diseases of the Optic Nerve are deemed worthy of only two and a half pages.

The book is sparingly illustrated, and a few more figures in the second part would, we think, help the student considerably. It is regrettable that so many printer's errors have been allowed to pass unnoticed when reading the proof-sheets. Like the former volumes of this series, the book is well printed and nicely got up.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

THURSDAY, NOVEMBER 8TH, 1888.

J. W. HULKE, F.R.S., President, in the Chair.

Reported by JOHN ABERCROMBIE, M.D.

Congenital Lateral Deviation of the Eyes.—Mr. Swanzy (Dublin) narrated a case of conjugate lateral deviation of the eyes, probably due to a congenital lesion. The patient was a healthy child one year old. Both eyes were turned to the right, but could be turned to the left with an effort, yet not as far as the canthi, and when they passed the middle line the effort was attended with nystagmic motions. The associated action of the interni for the purpose of convergence was unimpaired. The vision was good, and the ophthalmoscopic appearances normal. After birth, the labour being natural, the child had not opened its eyes for four days, and from that

time until it was two months old there was marked nystagmus in all positions of the eyes. From that age the other relations, including the father, noticed the condition described, but the mother did not do so until the child was six months old, and after it had had a fall on the right side of its head, which produced a bruise. This fall was not followed by any head symptoms. Mr. Swanzy regarded the case as due to an intra-uterine lesion situated in the pons and implicating the nucleus common to the sixth and third nerves on the left side. The symptoms might have been caused by the fall producing a cortical lesion in the right cerebral hemisphere, but experience caused doubt whether a conjugate deviation due to a cortical lesion would be so permanent a symptom, while its permanence as the result of nuclear disease was in consonance with our knowledge of nuclear paralysis in general. The evidence of all the relations except the mother was in favour of the deviation having been present before the fall. Probably the lesion was at first an irritative one and caused the nystagmus for the first two months, and then it passed on to be destructive, but destructive only in such a degree as to lame without absolutely paralysing the left nuclear centre for the third and sixth nerves. This seemed to be the only recorded case of congenital conjugate lateral deviation.

Mr. Doyne had seen an almost exactly similar case in a boy aged nine. It was found on examination by test types that the head, which was at first straight, gradually turned to one side. On close inspection it was seen that shortly after the attention was directed to the object nystagmus began, and then the head turned to the left, the eyes remaining fixed. There had been lagging of one leg in walking for two years. It was not known if the ocular condition was congenital.

Mr. Lawford mentioned that there was at least one case on record which seemed to bear upon the case just narrated. It was that of a man who all his life had conjugate deviation of the eyes to the right. After death it was found that the right internal rectus was absent, and that the left external rectus was exceedingly ill-developed. It was possible that a somewhat similar condition existed in Mr. Swanzy's patient.

The Ciliary Processes and the Suspensory Ligament.—Mr. Lang read a communication on this subject, in which he

said that with one exception, so far as he had been able to ascertain, all the drawings and descriptions of the zonule of Zinn had been made from prepared specimens. The exception was that of a case recorded in the *Klinische Monatsblätter* (1887, p. 205), by Professor Hjort, of Christiania. In that case the iris was completely torn away by an accident, which left an otherwise normal eye, in which the action of myotics on the ciliary processes could be readily observed. In the case which he had brought before the Society the lens and iris of the left eye had been completely removed by an accident, which the patient sustained eight months previously. The injured eye had become quiet, and presented the following appearance; the lower part of the cornea was quite opaque, and adherent to it posteriorly was a thin membrane, the lens capsule, which contained between its layers a few *débris* of the lens, as well as some proliferating lens fibres, similar to those shown to the Society last session by Mr. Gunn. Behind the periphery of the cornea were seen the ciliary processes, between each of which lay a bundle of fibres. About 1 mm. or 1.25 mm. from the tips of the ciliary processes, was seen the margin of the lens capsule; before reaching the capsule the suspensory ligament was grouped in separate bundles, between each pair of which there was a clear space which gave room for the ciliary muscle. In his patient some of the processes filled these spaces more than others. On reaching the capsule the fibres spread out in a radiating manner for a distance of 2 or 3 mm. from the margin before they were lost to sight. The appearance just described was only seen on looking directly at the eye. On looking obliquely, each bundle of fibres forming the suspensory ligament was seen to consist of many fibres placed behind one another, some being inserted at the back and some in the front of the lens capsule. On applying eserine, and again homatropine, no change could be observed, either in the size or position of the ciliary processes, although the eserine produced its characteristic pain in the eye. This absence of change in the ciliary processes was not to be wondered at, since in all probability it was brought about partially by the lens changing its shape when the ciliary muscles relaxed the ligament, and not entirely by the contraction of the muscle.

Dr. Hill Griffiths thought Mr. Lang's specimens showed that the suspensory ligament consisted of a set of fibres with spaces between them, and not, as usually described, of a membrane formed of plications of the suspensory ligament. Last year he had read before the Society an account of some cases of choroiditis associated with descemetitis. If Mr. Lang's view was correct, that the suspensory ligament was a permeable structure, the explanation of such cases did not seem so impossible.

Mr. Brailey wrote a paper some time ago stating that the ligament was a series of fibres running from the ciliary processes and from the spaces between them to the lens margin. Behind this there was undoubtedly a continuation forward of the hyaloid membrane behind the lens capsule. If there were no membrane closing the anterior surface of the space, there would be no obstruction other than the hyaloid to the passage of fluid from the vitreous to the posterior chamber.

The President observed that Sir W. Bowman had many years ago described the fibres which formed part of the suspensory ligament. The general belief was that there was an extremely delicate membrane occupying the interstices between the bundles of fibres. If such a membrane did not exist how was it that the space behind the suspensory ligament could be injected without the injection fluid passing through the ligament?

On a Point in Connection with Retinal Hemorrhage.—Mr. Lang remarked that the circular appearance seen in cases of hæmorrhage at the yellow spot was probably due to the hæmorrhage separating the hyaloid from the retina in a centrifugal manner, in the same way as a stone thrown into a pond produced a circular wave. He considered this to be the case rather than that it should be due to any particular anatomical arrangement of the hyaloid at the yellow spot, since he had seen a similar circular hæmorrhage at the equator of the eye at the temporal side.

Mr. Gunn remarked that if the hæmorrhage were between the vitreous and the retina, it must have detached the hyaloid membrane.

Prince's Operation for Advancement of Recti.—Mr. G. A. Berry communicated this paper, in which he advocated

certain departures in minor points from the operation as originally described. He used the so-called pulley suture, which was run two or three times out and in over a large extent of the circumcorneal tissue ; this suture was thus able to bear a considerable strain, and there was no danger of its cutting its way out. The other suture he used single, and not double, and before introducing the suture he freed the muscle for some distance back, and the muscle was then perforated by the suture further back than the conjunctiva ; before the ends of the suture were tied the patient was directed to look at a distant object, so as to produce a slight degree of over-correction. He thought that the advantages of Prince's method over the other operations were : 1. That as there was only one knot to tie in bringing the muscle forward, it was much easier to regulate at the time the effect required. 2. That it secured an advancement, not only of the direct but also of the indirect attachments of the muscle ; and 3. That it obviated any vertical displacement of the tendon, and that there was less tendency for the thread to slip through the muscle.

Mr. Adams Frost said the object of the double suture was to regulate the amount of correction, the first, if necessary, being cut through, and the second adjusted as required.

Mr. Edgar Browne considered Prince's operation had a tendency to ruck the muscle, whereas he liked to spread it out as much as possible, and therefore preferred the old double suture which could be fastened with a bow to facilitate untying.

The President thought that the agglutination that would take place in the first two or three days would render any loosening or tightening of the suture impossible.

Mr. Lang said that Dr. Prince altered the bow in a few hours, not days, his object being to see if the muscle had recovered its tone. To avoid the rucking he had picked up the muscle only, and avoided the conjunctiva, transfixing only the subconjunctival tissue ; there was then no rucking and no scarring ; the conjunctiva was sutured separately. He had found Dr. Prince's forceps were the best for keeping the muscle flat.

Mr. Mackinlay had found Prince's operation a good one, the only fault being the liability of the muscle to ruck up.

He agreed that the suture must be regulated at the time of operation.

Mr. Swanzy used Schweigger's method ; the only objection was that sometimes a swelling was left close to the cornea, resulting in a red unsightly lump, which did not disappear.

Card Specimens.—Mr. Frost : (1) Case of Double Proptosis ; (2) Peculiar Changes at Yellow Spot ; (3) Unusual Branching of Retinal Veins. Mr. Lang : (1) Case of Excision of Corneal Staphyloma ; (2) Case of Anophthalmos. Mr. W. J. Collins : Section of Melanotic Conjunctiva.

OPHTHALMOLOGICAL SOCIETY.

NOVEMBER 9TH, 1888.

The Bowman Lecture on "The Value of Eye Symptoms in the Localisation of Cerebral Disease."

By HENRY R. SWANZY, A.M., M.B., F.R.C.S.I.

In the following brief abstract we have endeavoured to give a general survey of the ground covered by Mr. Swanzy's lecture. For a full report we must refer to the weekly journals.

The lecturer began by remarking that the recent advances in cerebral surgery have brought increased anxiety and responsibility for the surgeon, especially at the outset of a case, when the regional diagnosis has to be made ; and although our present knowledge of the anatomy, physiology, and pathology of the brain frequently enables us to diagnose the position of focal lesions, many cases occur in which localisation cannot be successfully effected. He then spoke of the marvellous progress made in cerebral physiology in the last eighteen years, as giving promise of a gradual disappearance of all the difficulties we now experience in the localisation of cerebral disease, and proceeded somewhat as follows :—I incline to the opinion that eye symptoms in cases of focal cerebral disease are not as much valued as they should be, and are too often not looked for at first, but utilised rather as a *dernier ressort*.

I invite your attention to the facts provided for us by clinical pathology rather than to those of experimental comparative physiology ; for important as are experiments on animals, the evidence of the bedside and the *post mortem* table is even more so.

In estimating the localising value of the eye symptoms afforded by a given case of recent brain disease, we are immediately confronted with the difficulty of distinguishing between direct symptoms and the so-called indirect symptoms ; the former depending upon the loss of function of the part in which the lesion is situated, the latter being the result not of local disorganisation by the lesion, but of its pressure, of disturbances of circulation caused by it, and possibly, of inhibition effects. I suggest as a more suitable term "distant symptom."

There is nothing in the manner in which focal eye symptoms present themselves which can enable us to distinguish between direct and distant symptoms. Some symptoms are more often distant than others, and I shall endeavour to point out those which seem to be respectively the most and the least prone to be distant.

There is probably no part of the brain in which a destructive lesion may not be present without producing any focal symptoms ; and lesions in those parts of the brain which as a rule give rise to eye symptoms, may sometimes be latent, like lesions elsewhere.

Focal eye symptoms may be divided naturally into those which depend upon disturbances in the motor apparatus of the eyeball, including the intraocular muscles, and those which depend upon disturbances in the special visual apparatus. We have also to consider symptoms due to lesion of the nerve of ordinary sensation of the surface of the eyeball.

And, first, as regards the symptoms derivable from the motor apparatus. In the cerebral cortex, centres exist for the motions of the face, arm, and leg respectively, but no centre, in precisely the same sense, for the motions of the eyeball is present ; that is to say, there is no centre in the cortex of one hemisphere a lesion of which will produce ophthalmoplegia, partial or complete, of the opposite eyeball alone. All are agreed that only the associated motions of the two eyes are represented in the cortex.

By far the most common derangement of these associated movements, as the result of cortical lesions, is conjugate deviation of the eyes to one side—that is, abnormal function of the internal rectus of the one eye, and of the external rectus of the other eye. In paralysis, the deviation being towards the side of the lesion, the eyes look at the cerebral lesion, as Prevost has expressed it; and in spasm, from the side of the lesion. In many of these cases the eyes can be moved as far as the middle line, or even further, by an effort of the will. We are not able, as yet, to say where the cortical centre for these motions resides in man, for Grasset's statement* that it is situated in the supra-marginal and angular gyrus has not been verified. Conjugate deviation is very apt to be a distant symptom, especially in cerebral hæmorrhage, when it is often accompanied by a rotation of the head in the corresponding direction, and lasts only a brief time. Moreover, it is thought that, when this centre may happen to be actually involved in the lesion, its function, being largely bilateral, is rapidly taken up by the opposite hemisphere; and hence, even when conjugate lateral deviation plays the part of a direct cortical symptom, it can never be recognised as such, owing to its evanescent character.

Again, conjugate lateral deviation similar in character to that caused by a cortical lesion may proceed from a lesion of the internal capsule, or may be caused by a lesion of the pons, involving the nucleus for the associated action of the third and sixth nerves which probably resides in the superior olivary body. But conjugate deviation from a lesion in this locality differs from that due to lesion of the cortex or internal capsule, inasmuch as the eyes are here turned away from the lesion towards the hemiplegic side in paralysis, and towards the lesion, away from the convulsed side of the body in irritating lesions.

Gowers† points out that in these pontine lesions, if the disease is above the nucleus of the sixth nerve, the eyes cannot be moved towards the side of the lesion beyond the middle line, but convergence power is retained; if the nucleus

* *De la Deviation Conjugée*. Paris, 1879.

† *Diseases of the Brain*, p. 167.

of the sixth be involved there is complete loss of power of the external rectus, while the other eye can be moved by its internal rectus as far as the middle line, but no further (Broadbent); lastly, if the fibres of the sixth nerve in the pons, after leaving their nucleus, be injured, the external rectus is paralysed, but the associated action of the internal rectus of the other eye is not impaired. Conjugate deviations due to pontine lesions differ again from those due to cortical or capsular lesions, in that they are almost always direct symptoms.

Paralysis of the upward and downward motions of both eyeballs, sometimes with ptosis, while the lateral motions are unimpaired, may be the result of a focal lesion involving the third nerve nuclei in the floor of the Sylvian aqueduct; and, if attended by hemiplegia, the lesion involves the pyramidal tracts, probably at the level of the anterior quadrigeminal bodies, the posterior commissure, and the neighbouring part of the optic thalamus. Lang and W. A. Fitzgerald reported a case to this Society* in which this symptom and hemianopsia were the two focal signs.

Deviation of one eye downwards and outwards, while its fellow turns upwards and inwards has been seen with lesion of the middle cerebral peduncle.

Passing on to ocular paralyses which are not conjugate, we find that partial or complete ptosis may be present as a focal symptom in cortical lesions, no other branch of the third nerve being affected. It is not improbable that a separate cortical centre for this branch exists, and that it innervates the muscle of the opposite side, but as yet no value can be attached to cerebral ptosis, as a localising symptom of cortical lesions.

It is evident that lesions causing bilateral paralysis of branches of the third nerve which are wont to be innervated together—loss of motion of the eye upwards, of motion of the eye downwards, of convergence, and double ptosis—are to be sought for in the quadrigeminal bodies. Basal lesions do not give rise to similar paralysis.

Ptosis on the side of the lesion has occasionally formed a symptom in disease of the pons, without paralysis of the

* *Trans. Ophth. Soc.*, vol. ii. p. 235.

other branches of the third nerve—except, sometimes, in so far as conjugate deviation is concerned—and without the third nerve being involved in the lesion. A case of this kind has been recorded by Wernicke.*

Ptoſis, occurring in crossed paralysis may serve to localise a lesion in the crus cerebri, though as a general rule lesions in this situation paralyse the third nerve as a whole.

Nothnagel has described† a condition called sympathetic or pseudo-ptosis occurring in connection with symptoms of one-sided vasomotor paralysis, which he has met with in lesions of the corpus striatum. Paralysis of the third nerve coming on simultaneously with hemiplegia of the opposite side indicates disease of the crus cerebri.‡ Complete paralysis of every branch of the third nerve, without other paralysis, is almost always basal.

Paralysis of the fourth nerve (isolated) has resulted from tumour of the pineal gland, but it is more apt to be produced by a basal lesion.

Paralysis of the sixth, when it forms the only focal sign, is probably due to disease at the base, or it is a distant symptom. I think I am correct in stating that there is no cranial nerve so liable to provide a distant symptom as the sixth. Gowers refers this liability to the lengthened course these nerves take over the most prominent part of the pons, which renders them readily affected by distant pressure. One or both nerves may in this way be paralysed. Wernicke states that sixth nerve paralysis is most apt to be present as a distant symptom when the lesion is in the cerebellum. When it is simultaneous in its onset with hemiplegia of the opposite side of the body it indicates a lesion in the pons, on the same side as the paralysed nerve.

Lagophthalmos from facial paralysis, is useful in differentiating a lesion in the internal capsule, or the facial cortical centre, when it is absent or very slight, from one implicating the portio dura in the pons, when it is often markedly present.

The condition of the pupils is rarely of much value in

* *Arch. für Psych. und Nervenkrankh.*, Bd. vii. p. 513.

† *Deutsches Arch. f. Klin. Med.* Bd. xl. 2, p. 217.

‡ *Hosp. Med.*, Jackson, *Lancet*, Sept. 6th, 1873.

occipital convolution, and the latter points out that in nearly all the cases of extensive lesion of the occipital cortex which caused hemianopsia, the cuneus and superior occipital convolutions were both implicated, while the middle and inferior occipital convolutions, the lingual and fusiform gyri, may all be disorganised without hemianopsia resulting.

Yet cases are on record in which the disease has attacked one or other, or all of these parts, and has left the cuneus and superior occipital convolution unscathed. In some of these the lesion, no doubt, extended deep enough to involve the optic fibres on their way from the cuneus and superior occipital convolution; but in others it certainly did not do so.

Gowers' view that the slight variations we meet with in the position of the dividing line at the fixation point, in hemianopic fields, depend upon slight individual differences in the decussation of the central optic fibres, is probably correct.

Cortical hemianopsia may be, but rarely is, a distant symptom. It may be incomplete, but we do not as yet know that a lesion of the visual centre can be so situated as to produce loss of precisely the upper or lower half of the half field; yet clinicists should bear in mind those interesting experiments made by Schäfer* on monkeys, which show that in these animals, as Munk had already proved for dogs, there is a correlation between the parts of the retina and of the occipital lobe.

In a case recently published by Verrey,† an autopsy was made on a patient with absolute right hemiachromatopsia, the result of an apoplectic attack twenty months before death. An old hæmorrhagic cyst was found in the lower part of the left occipital lobe, extending into the temporal lobe on the mesial side. It occupied the white substance of the inferior occipital convolution, and had destroyed the white substance of the posterior extremity of the occipito-temporal convolutions, and the postero-inferior part of the cuneus.

There can be no doubt but that the centres for the colour, form, and light senses are all present in the occipital lobe

* *Brain*. Parts 39 and 40, January, 1888.

† *Arch. d'Ophthal'mol.*, T. viii. No. 4

and posterior end of the occipito-temporal convolutions ; and it is possible that they are either, as Wilbrand suggests, arranged in layers one over the other in the cortex, or, as others think, placed side by side. The latter is the arrangement Dr. Verrey deduces from his case, and he thinks the colour-sense occupies the most inferior part of the occipital lobe, and probably the posterior part of the lingual and fusiform convolutions of the temporal lobe ; while higher, and more towards the superior part of the occipital lobe, is situated the cortical centre for the light-sense ; and probably between these two is the centre for the form-sense, for the latter was the function which, after the colour-sense, he found most affected. This agrees in the main with the view of Seguin and Nothnagel.

Relative hemianopsia can only occur with lesions of the cortex, hemianopsia from lesions elsewhere must always include all the visual perceptions.

Hemianopsia from a lesion in the optic radiations will often be indistinguishable from one in the cortex. Pronounced distant symptoms, such as hemiplegia, hemianæsthesia, ptosis, and so on, are more apt to be caused by a lesion here than in the cortex.

A lesion in the posterior third of the posterior limb of the internal capsule—the sensory crossway—is likely to produce complete hemianopsia ; because the nerve fibres are here collected together in a small space.

Total blindness of both eyes when it appears as a focal symptom, can only be due to a lesion involving the whole of the chiasma, or of both optic tracts. The great mass of clinical evidence is opposed to the idea that lesions of the corpora quadrigemina produce blindness.

A remarkable visual defect is that known as mind-blindness, or loss of visual memory—blindness, we may say, of what has long been known as “the mind’s eye.” Sight in the ordinary sense of the word—the reception of the retinal images by the visual centre—is unimpaired, but the psychological realisation of the retinal images is not effected.

The position of the cortical centre for visual memory is still a subject of discussion. Hitherto all the necropsies have been made in cases of general paralysis, and for definite knowledge we must wait for the *post-mortem* examination of

a case in which the symptom has been caused by cerebral hæmorrhage. Nothnagel, Wernicke, Wilbrand, and some other writers assign this function to all or most of that part of the occipital cortex which does not form the centre of vision. Gowers thinks it is either in the anterior part of the occipital lobes, or in the posterior part of the parietal lobes; but the latter, he believes, is the more probable. The interesting fact that, in Charcot's case, in a case recorded by Quaglino, in one by Landolt, and in my own case,* a derangement of the colour-sense came on simultaneously with mind-blindness, seems strong evidence in favour of a localisation of visual memory very close to the visual centre.

Word-blindness, or alexia—loss of the power of understanding printed or written speech-symbols—is held by many to be nothing more than partial mind-blindness. Gowers, Wernicke, and Wilbrand are of this opinion, and all these authors, as well as Ferrier and Broadbent, localise the lesions which produce the symptom in the angular gyrus of the left hemisphere. Nothnagel localises the centre for visual speech-symbols in the same region, but dissents from the view that word-blindness is to be included in mind-blindness.

A good many cases of alexia with right hemianopsia have been recorded, and a natural explanation of this combination of symptoms is supplied by the proximity of the centre for vision to the angular gyrus. Indeed, some authors go so far as to state that hemianopsia is present in all cases of word-blindness.

The remarkable symptom termed dyslexia was first described by Berlin,† who has observed it in six cases. Nieden‡ and Bruns§ have each recorded one case. All these cases have ended fatally. The details of the necropsies leave much to be desired. In every instance the lesion was on the left side of the brain, the patients being all right-handed. The disease seems to have occupied chiefly the inferior parietal lobule, extending sometimes as far forwards

* *Trans. Ophthalm. Soc.*, vol. iii. p. 185.

† *Arch. f. Psych.* Bd. xv. p. 276.

‡ *Arch. f. Augenheilk.* Bd. xvi. p. 162.

§ *Neurolog. Centralbl.*, 1855. Nos. 2 and 3.

as the inferior frontal convolution, and sometimes as far backwards as the angular gyrus. It is evident, however, that we must wait for more definite information with regard to the usual seat of the lesion, before this symptom can be utilised in practice for the purposes of localisation.

In crossed amblyopia—in which the eye on the side away from the cerebral lesion is almost blind, with very contracted field, while the field of the other eye is also contracted, but in a less degree—the lesion has been found in the lower and hinder part of the inferior parietal lobule.

With reference to optic neuritis, it is only necessary to state that it has no localising value.

The author concluded in the following words:—"And now, gentlemen, I have come to the end of this lecture, without having made any reference to that distinguished man in whose honour I have the honour to address you. And yet I do not believe you could wish that we should separate this evening without your having heard from me some expression of the esteem in which we hold Sir William Bowman, nor will I be guilty of such an omission. And here I might dwell upon Bowman's scientific attainments, upon the good work he did in years gone by—not alone in ophthalmology, but also in physiology—upon all this Society owes to his prestige and to his generosity, upon his clinical knowledge and his operative skill, and upon many another topic which his name suggests. But I prefer to remind you of the high standard of professional life he has shown us, a standard which we of a younger generation must endeavour to maintain. Conscientious in his relations with his patients, honourable in his relations with his professional brethren, careful not to put himself forward in any unrecognised manner, not seeking notoriety, simple, kind, courteous, dignified, William Bowman is presented to our mind's eye as the personification of the best of those qualities which go to make an English gentleman. We are indeed privileged in being permitted during his lifetime to offer some tribute to his distinguished scientific merit; but, while recognising how much we owe to him scientifically, I think, and I believe you will admit, we should not forget how much his everyday professional life has tended to give to the noble speciality he adorns that high tone which belongs to it. Our sincere

hope is that Sir William Bowman may long live to enjoy the honour conferred on him by his Queen, the love of those who are dearest to him, and the warm, heart-felt esteem of this Society."

AMERICAN OPHTHALMOLOGICAL SOCIETY.

SPECIAL MEETING, HELD AT WASHINGTON,
SEPTEMBER 18TH, 1888.

Reported by Dr. EDWARD JACKSON.

In the absence of the President and Vice-President, Dr. Henry W. Williams, of Boston, was called to the chair.

Tenotomy for the Correction of Heterophoria (Muscular Insufficiencies, Dynamic Squint).—Dr. D. Webster (New York) reported forty cases; twenty-five of which were operated on but once, fifteen were subjected to a second operation, and three had previously been operated on by other surgeons. Of his fifty-five operations, three were sections of the tendon of the inferior rectus muscle, seven of the superior rectus, nineteen of the external rectus, and twenty-six of the internal. A slight over-correction of the faulty tendency was generally aimed at, and usually attained. In three cases the effect had to be subsequently slightly diminished by the use of a suture. In a single case he regretted having operated. The operation was done by first raising the centre of the tendon with the forceps, snipping it with scissors, and then extending the incision, which was made just at the insertion of the tendon, either way, until the whole of the tendon was divided. The patient was then tested with prisms, the operation being always done under cocaine; and if the effect produced is not sufficient, portions of adjacent tissue are to be cautiously divided, until the desired result is secured.

Out of four epileptics operated upon, none were cured; but one had a temporary suspension of the fits, and another believed that they were favourably modified. Two cases of chorea were both notably benefited by the operation,

though not cured. In three males presenting conditions closely allied to hysteria, the results were remarkably good, an immediate cure being effected. Most of the operations were done for the relief of head-ache or symptoms of muscular asthenopia. The conclusions reached as the result of his experience were : No person should have tenotomy done for heterophoria alone, without some serious trouble traceable to it. Very slight degrees may demand such correction. All other methods of treatment should be tried before tenotomy is resorted to. It should be done under cocaine, and the effect obtained tested from time to time to guard against a deviation in the opposite direction. In judiciously selected cases, the results are quite as good as are obtained with most surgical procedures.

Dr. R. H. Derby kept patients with muscular insufficiencies under observation for many months ; wearing prisms, the strength of which was from time to time increased, as more of the insufficiency became manifest. This was the safe method of treating these cases, and they did well under such treatment.

Dr. E. C. Seguin had seen some of Dr. Webster's cases that had remained well to the present time. He suggested that some cases of this trouble might at the bottom be examples of a certain kind of neurosis.

Dr. H. D. Noyes had repeatedly observed a symmetrical development of the bones of the face and orbit as the cause of apparent tendency to vertical deviation of the visual axes, so-called hyperphoria. He had years ago treated pronounced insufficiencies of the superior and inferior muscles by the use of prisms and by tenotomy ; but the ultimate results of such treatment had not been satisfactory. He was satisfied that insufficiencies of the external recti were the most common of these insufficiencies. He would not operate in any case in which there was not a distinct surplus of power in the direction of the muscle, the tendon of which he intended to cut.

Dr. E. Jackson had seen cases in which complete division of a tendon, without disturbance of neighbouring parts, had not the slightest immediate effect on the ocular movements. In such cases the gradation of effect was to be obtained by gradation of the incisions into the surrounding tissue.

Dr. O. D. Pomeroy felt that he was not always able to determine by inspection and the ordinary tests when a tendon was entirely divided.

Is Astigmatism a Factor in the Causation of Glaucoma?
—Dr. S. Theobald (Baltimore) had observed, when the meridian of least refraction is vertical, or nearly so, there is more asthenopia, head-ache, or likelihood of pathological changes in the eye, than when it is horizontal, or nearly so. This variety of astigmatism is uncommon, and must be regarded as a wider departure from emmetropia than the common form. Because of the persistent effort of the ciliary muscle to correct it, this variety of astigmatism is more difficult to detect, and the whole of it often cannot be rendered manifest at the first examination, even by the aid of a mydriatic. It was this less common, more troublesome variety of astigmatism that the writer had found, in most cases, associated with glaucoma. Hyperæmia of the ciliary muscle and choroid was a common result of astigmatism, and especially of this form. It would be likely to induce an undue flow of fluid into the vitreous chamber, and if, in such an eye, the anterior drainage apparatus happened to be defective, glaucoma would be apt to result.

Dr. W. S. Dennett believed that when the principal meridians were not perpendicular or horizontal, but oblique, astigmatism caused the greatest amount of trouble.

Dr. S. M. Burnett, using the ophthalmometer, had found that astigmatism against the rule commonly depended on the lens. He believed that lenticular astigmatism was very often due to an oblique position of the lens, and this oblique position might cause defect in the anterior drainage apparatus.

Mr. W. F. Mittendorf thought heredity a most important factor in glaucoma.

Treatment of Ulcers of the Cornea.—Dr. P. A. Callan (New York), after discussing the management of other forms of ulcers, made especial reference to those occurring without apparent cause, but due to some constitutional trouble, as malaria, syphilis, etc. The treatment for these is to find out the constitutional ailment and give the proper remedy; and, locally, to cocainize the eye, and, with a piece of absorbent cotton wrapped on a holder, to clean the

ulcer. Then, with another piece of cotton on the holder, dipped in a 2 per cent. solution of silver nitrate, swab the ulcer, trying to leave no part of it untouched with the solution. This may have to be repeated two or three times in the course of as many days. Bathe the eye in hot water (120° to 130° F.) three times daily for one half-hour. If much corneal irritation exist, bathe with boric acid solution, use atropia and cocaine after each bathing, and apply the bandage which would only do harm in cases of phlyctenular origin. The point is to get and keep the wound clean, and the silver nitrate does this better and more safely than it can be done by any other means, and, besides, it stimulates repair.

Dr. J. O. Tansley did not think that cocaine was beneficial in phlyctenular diseases, but eserine acted well.

Dr. H. W. Williams had watched the methods of treatment in vogue during over forty years. He favoured mild applications, and felt confidence in the good effects of pilocarpine and of hot bathing.

Dr. Carl Koller had learned that a principal indication in corneal ulcer was for the bandage, which was to be applied in different conditions for different reasons. Some ulcers heal under the bandage alone. Increased secretion, however, is a positive contra-indication to the use of the bandage.

Dr. W. F. Mittendorf thought the electric cautery should be used on sluggish ulcers, and on those inclined to spread rapidly.

Drs. F. M. Wilson, L. H. Taylor, J. O. Tansley, and H. W. Williams had found antipyrin of great service in relieving the pain of corneal ulcers and other painful affections of the eye.

Dr. Callan had used the galvano-cautery a good deal, but it was capable of doing harm as well as good. He had seen it open the anterior chamber when not intended, and increase the size of the cicatrix by the unnecessary destruction of sound tissue.

Meridional Astigmatism, or Aberration of the Eye.—Dr. E. Jackson (Philadelphia) proposed the name, meridional astigmatism, to designate that variety of “normal irregular

astigmatism" which causes rays of an incident pencil, piercing the cornea in the same meridian at different distances from the visual axis, to intersect that axis at different distances behind the cornea; while rays piercing the cornea in different meridians, but at the same distance from the visual axis, intersect it at the same point. He recognized two forms of the defect: one, the more common, resembling spherical aberration in lenses, in which the centre of the pupil was more hyperopic or less myopic than the margin, and which he termed the positive form; and the opposite, or negative form, in which the centre of the pupil was less hyperopic or more myopic than the margin.

The defect has been recognized subjectively and with the refraction ophthalmoscope; but for practical purposes it is to be studied clinically by skiascopy, the shadow test, especially with the plane mirror. The positive form causes a reversal of the light movement at the periphery of the pupil, while at the centre of the pupil the movement is still direct; and the negative causes a reversed movement at the centre, with direct movement at the periphery. In 100 eyes, seventy-eight presented positive aberration, nine a negative aberration, and in thirteen the difference of refraction between the centre and periphery of the pupil was not over 0.25D. High degrees of the negative form are caused by the lens changes in some cases of senile myopia, and still higher degrees are due to conical cornea. The play of light and shade in the pupil by which low degrees of conical cornea have been recognised occurs in any case of high meridional aberration.

The defect causes a lowering of visual acuteness in some cases, more when low degrees extend well on to the central area of the pupil than where higher degrees are confined to the pupillary margin. It renders the determination of the amount of ametropia more difficult and uncertain, and may give rise to the impression that a really complete mydriasis is not complete. Negative aberration will account for the so-called "negative accommodation," or the increase of refraction supposed to be due "to tone" of the ciliary muscle. Positive aberration is the principal cause of the complaint patients make, that the correcting lenses which give them perfect vision in a good light interfere with

distant vision in a dim light. It is also of importance in some cases of hyperopia, where the eye-strain is felt only in a bright light or at near work: that is, with a contracted pupil.

Dr. S. M. Burnett had been quite misled by the title. The term "meridional astigmatism" had been otherwise applied, and he thought it badly chosen to designate the defect under consideration.

Dr. John Green thought that, in view of its close resemblance to spherical aberration, it would be better to call it an aberration with some qualifying adjective. While it might be theoretically proper to call it an astigmatism, to do so would be likely to lead to confusion.

Dr. Jackson did not himself feel entirely satisfied with the name he had proposed, and was quite ready to change it for the better. This was the time to make a change, to avoid such confusion as there had been in the naming of the shadow-test.

Numbering of Prisms by Degrees of Refractive Power.—The committee (Drs. E. Jackson, S. M. Burnett, and H. D. Noyes) appointed to consider this subject reported:—In designating a prism, we always wish to designate a particular refractive power; but the present system of numbering by refracting angle allows the refractive power of prisms to vary with the index of refraction of the glass used. In expressing deviations of the visual axes some authors use degrees of deviation, others the degrees of refracting angle; so that the introduction of the new system of numbering, instead of causing temporary confusion by a double standard, would, as soon as generally adopted, remove permanently the confusion already existing by reason of a double standard.

The endorsement of the following propositions was recommended:—

(1) Prisms ought to be designated by the number of degrees "minimum deviation" they produce.

(2) Where intervals of less than one degree are desired, half degrees and quarter degrees should be used.

(3) To indicate that degrees of deviation are meant the letter "d" should be used: thus prism 2° d. will indicate a prism that produces a minimum of two degrees.

Acute Cocaine Conjunctivitis.—Dr. W. F. Mittendorf (New York) thought that undesirable effects, due to its use on persons with an idiosyncrasy toward it, were to be expected with cocaine as with other drugs. He reported three cases in which its use caused violent acute conjunctivitis, with tense swollen lids and profuse acrid mucopurulent discharge. Two of the patients were elderly women, in one of whom there was also eczema of the lids, and a return of the conjunctivitis on resuming the use of the drug.

The third case was that of a man who had three successive attacks, brought on by the instillation of different samples of the drug.

Dr. John Green had noticed that eyes in which other mydriatics produced conjunctivitis were similarly intolerant of cocaine. He had also seen great hyperemia of the globe from the prolonged use of cocaine.

Dr. E. Jackson found that cocaine caused subsequent hyperemia, usually culminating three or four hours after its application, and frequently attended with discomfort or smarting. He had seen very serious damage to the cornea from its continued use at short intervals for conjunctivitis, and on that account would not place it in the hands of the patient for the relief of constant, or frequently recurring discomfort or pain.

Dr. W. W. Seely had proved that when the conjunctiva was liable to be irritated by mydriatics, it was similarly sensitive to the contact of other alkaloidal solutions.

Blepharospasm.—Dr. Carl Koller (New York) classed cases of this trouble under three heads—the neurotic, the hysterical, and those which were a reflex of ocular irritation. Many cases of the last class were comparable to fissure of the anus, an important factor being an abrasion, or fissure of the cutaneous surface at the outer canthus. To heal this fissure it is not usually necessary to cut the sphincter of the lids, but simply to cauterise it with blue stone, giving the protection of a film of coagulated albumen, and use an ointment of yellow oxide of mercury on the lids. In these cases cocaine gave but little relief, and that only temporarily when applied in large quantities.

Monocular Neuro-retinitis.—Dr. R. H. Derby (New York)

reported a case occurring in a girl, aged 12, whose father had had syphilis, but who had up to this time been free from any manifestations of it herself. The attack began with dimness of vision, and central scotoma, quickly followed by obscuration and swelling of the nerve entrance. The swelling increased until it reached 7D, and light perception was lost. Under mercurial inunctions and large doses of potassium iodide the swelling diminished, and vision improved to seven-tenths of the normal.

Dr. S. M. Burnett had seen two cases of monocular neuritis, in one of which it had recurred after a couple of years.

Extraction of the Dislocated Lens with the Aid of the Bident.—Dr. O. D. Pomeroy (New York) reported five cases, all successful, with the restoration of good vision. The bident, devised by the late Dr. C. R. Agnew, seemed not to have come into general use, although very much liked by those who had tried it. The patient should be placed face downward, and kept in that position until the lens settles down in contact with the cornea. Then ether is to be given and the bident introduced before the position of the patient is changed. Care must be taken in introducing the bident not to press the lens too tightly against the cornea, as that will hinder its extraction.

The corneal incision was made downward, and the lens extracted with a lens spoon or a sharp hook.

Dr. Pomeroy recommended the use of the bident for the extraction of the dislocated lens as safe, and effectual in preventing the return of the lens to the deeper parts of the eye.

Apparatus.—Dr. J. O. Tansley showed apparatus for demonstrating refraction by lenses in a box with glass sides, to be filled with smoke.

Dr. S. M. Burnett showed a disc of lenses for use in skiascopy.

